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HEALTH ASPECTS OF URBANIZATION IN AFRICA

Some of the earliest towns were in Africa, in the Nile valley and along the shore of the Mediterranean. In Africa as a whole, however, urbanization has been a phenomenon of the past century or less, a product of the contact of African with European civilization. The towns which are appearing or developing into cities all over Africa are not like the towns of ancient times or even like those of the Middle Ages, which grew slowly over the years. They resemble rather the towns of the Industrial Revolution of western Europe, which in a few years developed from villages into enormous sprawling conglomerations, the abode of "pestilential heapings of human beings".[1] In these nineteenth-century towns whole families occupied small dark rooms in dirty hovels without water or sanitation. The streets outside the houses were filthy, the rooms in which people lived more like pigsties than human habitations, unventilated, strewn with rushes that were seldom changed. There were no underground drains, and the soil of the town was soaked with the accumulated filth of centuries. Engels [2] described a slum in Manchester in 1844 as:

"... a disorderly collection of tall, three- or four-storied houses with narrow, crooked, filthy streets ... occupied from cellar to garret, filthy within and without, and their appearance ... such that no human being could possibly wish to live in them. But all this is nothing in comparison with the dwellings in the narrow courts and alleys between the streets, entered by covered passages between the houses, in which the filth and tottering ruin surpass all description. Scarcely a whole window-pane can be found, the walls are crumbling, door-posts and window-frames loose and broken ... Heaps of garbage and ashes lie in all directions, and the foul liquids emptied before the doors gather in stinking pools."

A report of a Royal Commission into the State of Large Towns and Populous Districts in England and Wales, 1845,[3] commenting on these horrors, remarked drily that:

"It is too commonly supposed that the evils above adverted to are the inseparable concomitants of poverty; and doubtless, so long as the inhabitants of the most neglected and filthy abodes in crowded cities are unable to provide for themselves better and healthier dwellings, sufficient light and air, more open situation, effective cleansing and drainage, and adequate supplies of water, their vigour and health are undermined, and their lives shortened by the deleterious external influences consequent upon the want of efficient arrangements for securing the above objects."

The expectation of life of the people who lived in these slums was extremely short. They were the prey to a host of diarrhoeal and respiratory diseases. Cholera, when it invaded the countries of western Europe in the great pandemics of the nineteenth century, killed large numbers of them. Tuberculosis was rife. The women died in large numbers in childbirth, and the mortality among the sickly, undernourished children was high. Food was always in short supply, and what there was was often unfit for human consumption. The climate in many of these industrial towns is cold and rainy for long periods during the year, and the atmosphere is polluted with soot and chemicals. In the nineteenth century the pollution was often worse, and many of the people who lived in the towns had neither warm clothing nor fires to protect them from the cold and damp. Overcrowding bred promiscuity, and venereal disease was common.

In Africa a somewhat similar process is at work. The towns are expanding in size at an astonishing speed. Luanda, in Angola, which had a population of 61 028 in 1940, had one

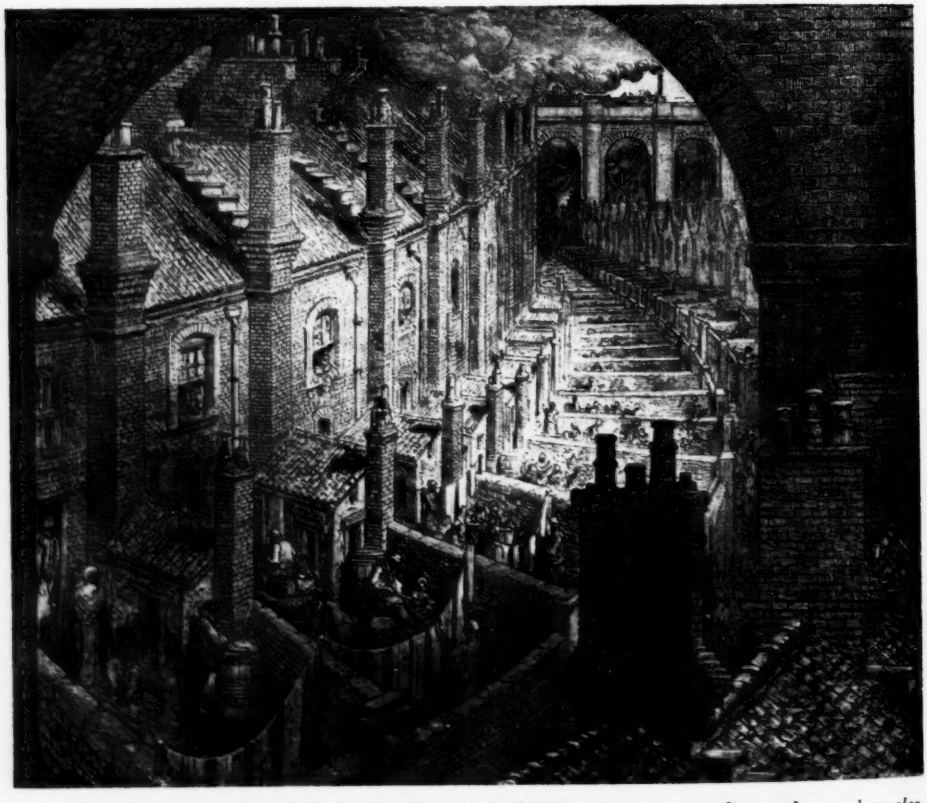
[1] Simon, J. (1887) *Public Health Reports*, London, vol. 1, p. 48 (Quoted in: Brockington, F. (1958) *World health*, Harmondsworth, Penguin Books)

[2] Engels, F. (1892) *The condition of the working-class in England in 1844*, London (first English edition) (Quoted in: Drummond, J. C. & Wilbraham, A. (1958) *The Englishman's food*, London, Jonathan Cape)

[3] Poore, G. V. (1889) *London (ancient and modern)*, London, p. 26 (Quoted in: Brockington, F. (1958) *World health*, Harmondsworth, Penguin Books)

of 189 390 in 1955. Tananarive, in Madagascar, had 104 000 in 1935 and 201 000 in 1958, the mean yearly increase of population being almost 5000. In Tanganyika the urban population has doubled in the past ten years. Léopoldville, in the Belgian Congo, had a population of 190 000 in 1950; it now has one of 320 000. There is no prospect of a change in this situation, which is mainly due to a vast influx of people from the country into the towns ; indeed, the urbanization of Africa is expected to continue at an increasing pace for many years.

The reasons for this drift to the towns are not peculiar to Africa, but are world-wide. In the rural areas there is much to do during the periods of sowing and of harvesting, but in between there are spells of inactivity when the young and active become bored and seek a means of escape from their boredom. In the past they might have devoted their leisure to warfare, but this is no longer possible. The impact of modern civilization is relaxing the hold upon them of their ancient traditions and customs, and they no longer submit tamely to the occasionally irksome requirements of tribal life. And the town is a magnet, with its promise of work, money, more freedom, and a variety of attractions to which distance lends enchantment.



Doré's nightmare evocation of the London slums in the 1870's—grime, overcrowding, and general squalor. In the rapidly growing towns of Africa, there is danger of a similar situation.

(© Radio Times Hulton Picture Library)

Life in the African village has scarcely changed in hundreds of years. The drift to the towns means not only a break with a traditional way of living, but adjustment to a completely different physical environment.

The change from village life to town life requires a great effort of adjustment in the immigrant. In the African village people generally produce enough to feed, house and clothe themselves. They trade by barter, exchanging what they produce for the commodities which satisfy their simple needs. They are on the whole their own masters. In the village status is determined by birth: a chief's son is likely to become a chief himself and he will in any case be an important person in the community. Traditions govern behaviour, and the need for the enforcement of law is thereby diminished. Village life is based upon the extended family; members live in the same compound and pool resources, forming thus a sort of miniature welfare state and presenting a united front against the world. Marriage, determined by custom, is a contract between families.

In the town the situation is totally different. Instead of the subsistence system of the villages there is a money system; everything must be paid for, there is an opportunity of saving money against future needs, or of squandering it on present pleasures. The immigrant is no longer master of his own time; he must work specific hours and keep to a schedule. Nor does his status in the village give him any advantages: in the town his position in the community is determined by his own performance. The traditional standards of behaviour of the village are lacking, so that enforcement of law and order acquires a new importance. The extended family system holds no sway in the town, where indeed an individual may have no relatives at all, and he must therefore, whether he is well or ill, depend on his own efforts or on the goodwill of some voluntary or government agency. Marriage is no longer a contract between two families, but between two individuals, whose families may not even live in the same or a neighbouring village or town.

The change from village life to town life in Africa will require more than a mere adjustment of the individual's standards of conduct, it will also require an adjustment to a different material environment. In the village there is no shortage of land, but in the town it is both in short supply and expensive, so that the problem of housing may well be acute. In the village, too, while precautions against disease are important,

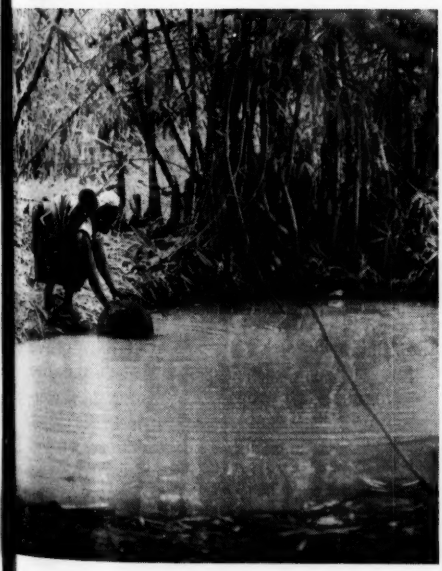
they are less urgent than in the town because there are plenty of open spaces and no overcrowding; village standards of sanitation may indeed be downright dangerous in the town.

The situation created by the rapid urbanization of Africa was examined in its medical aspects by the WHO Regional Committee for Africa at its ninth session in Nairobi in September 1959. The influx of immigrants into the towns leads to overcrowding, which in turn produces water shortages, overloading of existing sewage disposal systems, the creation of fresh sanitary problems in towns without such systems, and the risk of spread of infectious diseases. The rural immigrant, as one of the contributors to the Committee's discussion pointed out, is the least adequately protected of all town dwellers from the standpoint of environmental sanitation because of his poverty and his ignorance of the ways of the town. He is poorly housed and badly fed; he is without access to a wholesome water supply; his personal hygiene is of the lowest standard. Sanitary measures seem to be designed less to protect his health than to protect the town community from any infection he might carry. His attempts to earn a living by hawking food and drink, for example, are frowned upon. Householders are prevented by anticrowding measures from giving him cheap shelter. His very presence in the town is discouraged, not only by the health authorities but also by the police. He accordingly settles outside the town, entering it daily to look for employment; and the overcrowded, insanitary hovels in which he and his fellow-immigrants live form the peri-urban slums, the "shanty towns", of modern Africa. From the sanitary aspect Engels' description of the Manchester slums in 1844 is applicable to these shanty towns. Sanitation is nonexistent, and open drains run down what passes for streets. The shanties are built of mud and wattle, old packing-cases, or kerosene tins, with tattered blankets as doors. Children crawl among the uncollected rubbish or in the drains. Water has to be fechted from a pump, well or tap, and may be contamined. The atmosphere is unlikely to be polluted, as it was so often in Industial Revolution towns, and the warmer climate leads to life being spent out of doors to an extent not possible in more northern latitudes; but the climate also encourages vast numbers of flies and mosquitos and, in places, the snails which transmit bilharziasis. Occasional floods convert the ground into a quagmire. Malaria, the diarrhoeal diseases, tuberculosis, bilharziasis, and the helminthiases all abound. Malnutrition is common, with its train of deficiency diseases and kwashiorkor. The destruction of tribal traditions and the general social disorganization lead to alcoholism, prostitution, and venereal disease; and mental disorders are frequent. Morbidity and mortality are both high.

There is much general agreement on the steps to be taken to remedy the situation created by the too rapid urbanization of African towns, and a feeling that the evils of the Industrial Revolution should be avoided as far as is humanly possible. Towns should be planned to take account of the expansion of the population and of the peculiarities of the site upon which they are built. They should not, as one contributor to the Regional Committee's discussions emphasized, follow blindly advice given years ago for circumstances that have changed utterly since. The instance he cited is Tanganyika, which abounds in small trading centres. These centres all look much alike, not surprisingly since they were all planned in accordance with the guidance given to those responsible for their sanitary control in a pamphlet published some thirty years ago. The standard lay-out was of the geometric grid-iron pattern, and was more or less faithfully followed irrespective of whether the trading centres were on the plain, in the valleys, or on the tops of hills. If the centres remained small and the site was flat little harm resulted from following the plan recommended, but if, as has happened at Dar es Salaam, Moshi and elsewhere through Tanganyika, the centres have become the hub of large towns, there is difficulty in zoning and in the provision of adequate sanitary services. With an undulating or sloping site a gravity system of main pipe drainage may be impossible. In the

From slum to planned community. The tumbledown shanties of Tema in Ghana (above, left) have now been replaced by clean, modern dwellings (above, right).

An African village woman fills her pitcher at the water-hole (below, left). In the growing towns, sources of supply are often scarcely less primitive, domestic supplies of running water as in the new Ghanaian town of Tema (below, right) being the exception rather than the rule.



planning of a town for future expansion there is always the difficulty that expansion may not take place; but in the light of the world-wide trend towards urbanization it may confidently be assumed that for every case of expansion that does not take place there will be ten that will.

Town planning must, the Committee agreed, allow for the provision of adequate healthy housing within the means of the lowest paid worker; for the supply of abundant and safe drinking water; and for the satisfactory disposal of waste products and storm water. The Ministry of Health, Ghana, in a contribution to the Committee's deliberations described the problem of the disposal of waste matter, including sullage and storm water, as a constant headache for the public health worker in the urban areas. Except in Tema, which is being built, no town in Ghana has a sewerage scheme for the disposal of human wastes. Septic tanks are becoming more widely used, but in the larger towns excessive soil pollution and the pollution of the water supply through defective underground drains are a danger and—in the Ministry's words—a constant nightmare for the public health authorities of the country. The former system of disposing of night-soil by dumping it into the sea or by trenching, and the controlled tipping of general refuse, are no longer suitable for urban areas. None of the main towns has an adequate drainage system for sullage water, let alone storm water. In Accra certain parts of the town are flooded annually, with much ensuing inconvenience and damage to property. The housing shortage has increased public health problems in some directions, but the introduction of a piped water supply in some towns has led to the dramatic disappearance of such diseases as guinea-worm and bilharziasis.

Not the least important part of a town-planning programme is concerned with green belts. A contributor to the Committee's discussions from the Belgian Congo suggested that the result of the enormous increase in the number of buildings in Léopoldville to house its growing population has been, in the absence of green belts, to reduce the rainfall and create a microclimate which is less favourable for human habitation than when the town was smaller. Green belts function as air conditioners, as the lungs of a large town, and constitute one of the elements making for individual and social stability in a community.

If the new African towns are properly planned, with wide, well laid-out streets in keeping with local climatic conditions, green belts of sufficient size, houses that provide adequate protection against the fierce climate, efficient garbage disposal services, plentiful supplies of pure water, good sewerage systems, and offices and workshops in which the worker's health is really looked after, then—according to the Angola Health Services' contribution to the Committee's discussions—there is no reason why life in the towns should not be more healthy as well as more agreeable than life in the rural areas. The presence side by side of populations of different levels of civilization should be a powerful factor in the education of the less civilized, not only in matters of health but also generally; for it must be remembered that the towns are the main centres from which the elite and the ruling classes of a country are recruited.

Because of the ignorance of the rural immigrants health education should be given a major role. The quarters of the town in which they live, however, cannot be left in neglect; sanitation should be enforced, but it should be adapted to their habits and traditions as closely as possible, so that there is no maladjustment or need for the use of excessive constraint. Little by little, the immigrants will adapt themselves to the new conception of life that they will acquire in the towns. In the meantime the health authorities will combine persuasion with only that amount of compulsion that will be necessary to secure an adequate sanitary standard.

The Regional Committee for Africa stressed the need for the preventive and curative services to adapt themselves to the new conditions created by urbanization. A closer relationship should be built up between the patient and the doctor and reinforced by an ample service of community nurses. The people concerned should be told why health measures are required; with adequate health

propaganda the chances of their reacting favourably are greatly increased. All the health problems raised by urbanization depend on local factors, climatic, topographical, human, economic, and social, and these must be carefully studied so that the most suitable technical methods can be applied to making African towns habitable for everyone.

THE DIARRHOEAL DISEASES

In few diseases of comparable public health importance is there so much confusion about etiology and treatment as in the diarrhoeal diseases, which are the principal causes of death among infants and children in many countries. A recent issue of the WHO Bulletin[1] *contained a collection of papers presented at a meeting of a WHO Study Group on Diarrhoeal Diseases in November 1958.*[2] *The article below is based upon these papers, and upon the unpublished report of the Study Group (document WHO/D.D./25).*

A WHO Study Group on Diarrhoeal Diseases met in November 1958 to consider how a more concentrated attack could be made on these diseases, and how past experience and present knowledge could be used to bring about within a matter of years in the less developed countries the advances in this field achieved in decades in the more developed countries. To make comparisons between countries possible, the Group felt that the term " diarrhoea " should be defined. Diarrhoea should be held to be present, it suggested, in children up to 2 years of age if they pass three or more soft or liquid stools within 12 hours or a single soft or liquid stool containing blood, pus, or mucus; and in persons of 3 years or over if they pass two or more soft or liquid stools within 12 hours or a single soft or liquid stool containing blood, pus, or mucus. The changes in the stools should be verified by qualified persons.

To obviate controversy, the Group thought that all diseases in which diarrhoea is a leading symptom, e.g., cholera, typhoid fever, intestinal parasitism, enteric virus infections, and malnutrition with diarrhoea, should be classed as diarrhoeal diseases.

One of the chief difficulties about the diarrhoeal diseases is their classification: clinically and etiologically similar or even identical entities have different names in different localities, and deaths are classified under different categories. The International Statistical Classification of Diseases, Injuries, and Causes of Death [3] does not help to clarify the position, because, while it classifies acute diarrhoeal diseases of specified etiology under the relevant heading regardless of age (e.g., bacillary dysentery or the salmonelloses), it classifies " diarrhoea " and " gastro-enteritis and colitis " into separate categories according to age, and also includes " diarrhoea, age 2 years and over " in the section " Symptoms, senility, and ill-defined conditions ". This classification under several headings is continued in the condensed lists under which statistics are generally published, and cannot be said to simplify the collection of data on the diarrhoeal diseases. The Study Group felt that, at the next revision of the Classification, an attempt should be made to bring the terms used in diagnosis into accordance with the terms used in the Classification. Terms like " dyspepsia ", " gastro-enteritis ", " enteritis ", " colitis ", " entero-colitis ", " dysentery ", and " toxicosis " mean different things in

[1] *Bull. Wld Hlth Org.*, 1959, 21, 245

[2] Members of the Study Group: Dr A. V. Hardy, USA, (Chairman); Dr D. Kačarević, Yugoslavia; Professor E. Novgorodskaya-Linetskaya, USSR; Dr H. M. Penido, Brazil; Professor J. Sénécal, Senegal; Dr J. Taylor, United Kingdom (Rapporteur). Secretariat: Dr N. Ansari, WHO (Secretary); Dr H. G. Baity, WHO; Dr J. M. Bengoa, WHO; Dr Y. Biraud, WHO; Dr M. Cakrtova, WHO; Dr B. Cvjetanović, WHO Regional Office for Europe; Mr J. N. Lanoix, WHO; Professor N. K. Ordway, USA (Consultant); Dr B. Pirc, WHO; Mr D. J. Schliessman, USA (Consultant); Dr C. Williams (Consultant); Dr V. Winnicka, WHO.

[3] World Health Organization (1957) *Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death, 1955 revision*, Geneva

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different countries, and until they acquire meanings that are understood internationally they must inevitably cause confusion.

The extent of the problem

Although statistics of the diarrhoeal diseases are far from complete, and mortality is probably highest in the countries which have the least reliable statistics, existing data are sufficient to show that they are the leading cause of death in a number of countries, and particularly affect children under 5 years of age. When they do not kill, they cause illness, both in children and in adults, and are an important source of economic loss. In Yugoslavia in 1952 49% of all deaths in a single paediatric unit in Sarajevo were due to diarrhoeal diseases. At the Dakar maternal and child health centre in Senegal, out of 60 186 children examined in 1957, 13 428 had diarrhoea; and of the 2272 children admitted to hospital by the paediatric service, 331 were admitted for diarrhoea. Mortality statistics from the same service for the period July-October 1958 showed that 42.6% of the 977 admissions were for diarrhoea, and of these 42.3% died. In Brazil, an average of 34.9% of deaths in the Federal District in 1956-1957 were attributable to the diarrhoeal diseases; the percentage was 38.7 in the municipality of São Paulo in 1956 and 30 in the municipality of Recife in 1957.

Even in the developed countries, where the mortality figures are low, the morbidity is far from negligible, as has been shown by investigations in Cleveland, Ohio, USA, and in Newcastle-upon-Tyne, England. In Russia in 1913 40-50% of children admitted to hospital with " toxic dyspepsia " died. Today, by contrast, in many children's hospitals and in certain cities the rate is between 1.5% and 2%, and for dysentery between 0.5% and 1%. Although the mortality and morbidity rates have fallen greatly and are still falling in the more developed countries, there is still some mortality, and rather more morbidity.

Causes of the diarrhoeal diseases

While there is a certain amount of information about the part played by *Salmonella*, *Shigella*, and *Escherichia coli* in the diarrhoeal diseases, there is very little real knowledge of the relative importance of viruses, parasites, and malnutrition. How far, for example, malnutrition is a cause of diarrhoea, or how far diarrhoea is a cause of malnutrition, it is difficult to say. Indeed, for the world as a whole most diarrhoeal diseases are of unknown etiology, so that estimates of the relative importance of the causative agents are subject to correction in the light of better statistics and epidemiological information.

As far as can be ascertained, now that cholera is limited to a relatively few areas, *Shigella* is the chief pathogenic agent in areas of high diarrhoea morbidity.[4] As a consequence, the prevalence of *Shigella* has been widely employed as an indicator in studies of the epidemiology of the diarrhoeal diseases. Infection with *Shigella* is uncommon in the first six months of life, rises rapidly to a peak in the second year, then gradually falls. Data from reported epidemics indicate that about two-thirds of the cases are attributable to *Shigella*. Second to *Shigella* is *Salmonella*, numerous species being involved. In contrast to *Shigella*, the rate of infection is highest in young infants: in a study of children in Texas, for example, infection with *Salmonella* was found to be double that with *Shigella* in infants, whereas in children over one *Shigella* was commoner, in the ratio of 7 : 1. In the past decade a large number of hospital epidemics of infant diarrhoea have been shown to be due to a variety of types of *Escherichia coli*, but the importance of this organism in the community still remains to be established. The emergence of *Staphylococcus* as a pathogen may be related to its growing resistance to antibiotics, but its role as an agent in the causation of diarrhoeal disease seems to be small. Intestinal parasites are the cause of much illness in the world, but do not appear to cause much diarrhoea, expect perhaps indirectly by their association with malnutrition. Viruses have often been incriminated, and in some countries evidence has been produced that some of the enteroviruses may cause diarrhoea; but their impor-

[4] Ordway, N. (1960) *Bull. Wld Hlth Org.*, 23 (In press)

tance in the community is still unknown. Also unknown is the part played by infections elsewhere than in the intestinal tract; Professor Ordway [5] thinks that the concept of "parenteral diarrhoea" is over-rated, but it is one that is widely held.

The difficulties about etiology may be illustrated by the situation in some countries. In a study in England and Wales of 905 patients with diarrhoea, enteropathogenic *E. coli* were present in 24%, *Shigella* in 7.5%, and *Salmonella* in 1.6%, leaving the majority undiagnosed. In Leningrad, USSR, of 1215 children under 1 year with diarrhoea, 2.7% had salmonellosis, 14.4% shigellosis, and 82.8% *E. coli* infection among those from whom a causative agent was isolated.

In Brazil, where an outbreak of diarrhoeal disease occurred in 1957 in Fortaleza, in 70 children examined 42.8% of infections were attributable to *Shigella*, 10% to *Salmonella*, and 14.3% to pathogenic *E. coli*. As far as is known the most important etiological agent in Yugoslavia is *Shigella*, although outbreaks of *Salmonella* and *E. coli* infection do occur. In Losnica, Yugoslavia, investigations on the carrier rate revealed that 50% of the population were harbouring *Shigella*. In the same town helminthic and protozoal infections were found in conjunction with the *Shigella*; but their role was impossible to determine.

What is the relationship of malnutrition to the diarrhoeal diseases? Much has been written to stress the association of the two. A South African study of 100 consecutive cases of diarrhoea found that 12 out of 17 undernourished children over 5 months of age had had attacks of diarrhoea previously, whereas only 9 out of 47 adequately nourished children had had them.[6] On the other hand, diarrhoea is rampant in Egyptian communities where malnutrition is not common. In theory, malnutrition should lower the resistance to infection, but since the parasite is competing with the host for food lack of protein may react adversely on it as well. However, while a parasite may suffer more than the host when a specific dietary component, such as a vitamin, is lacking, generally the host is the chief sufferer. It has often been observed, for example, that a well-nourished animal has relatively few parasites. Nevertheless, enteric infection with bacteria and parasites has not been encountered any more frequently in patients with kwashiorkor than in those who are better nourished. It is generally accepted, although without adequate epidemiological evidence, that chronic diarrhoea is a symptom of kwashiorkor, but, since morbidity and mortality reach their peak at an earlier age for diarrhoea than for kwashiorkor, conclusions based on older children do not necessarily apply to younger ones, most of whom present less striking evidence of malnutrition. Whatever its etiology, diarrhoeal disease is aggravated by malnutrition; in the presence of the latter there is a marked disturbance of the body fluids with a reduction in the osmotic pressure and an expansion of the extracellular space, a condition which is often associated with diarrhoea and responds relatively poorly to generally accepted modern methods of intravenous fluid therapy. Does diarrhoea lead to malnutrition? Some of the evidence indicates that it might; observations show that the peak incidence of kwashiorkor follows that of diarrhoea.

Epidemiological investigations

Epidemiological information on the diarrhoeal diseases is still too meagre, particularly for the less-developed countries. Carefully designed, relatively detailed studies are needed. Good examples are those carried out in Yugoslavia by a team consisting of a bacteriologist, a parasitologist, and a clinician, under the direction of an epidemiologist. The supporting staff included nurses and other field workers, and technicians able to carry out a substantial number of examinations daily. A team of this kind would be strengthened by the addition of a sanitary engineer or other person who could deal with problems of environmental sanitation. It should also for preference be based on a suitable institution, since both facilities and personnel would then be easier to obtain.

[5] Ordway, N. (1960) *Bull. Wld Hlth Org.*, **23** (In press)
[6] Ordway, N. (1960) *Bull. Wld Hlth Org.*, **23** (In press)

Intensive studies of a limited population are the most promising approach to the investigation of the diarrhoeal diseases. The area would have to be chosen with care so that the findings should be as representative of as large a population group as possible, and as infants and children are most affected particular attention should be paid to them, though not to the exclusion of others. Plans for the studies would need to be based on a knowledge of local conditions, needs and resources. To make such studies worth while, laboratory investigations, including tests on family contacts and sampling of the general population, are obviously essential. Nutritional factors, and social, economic, and environmental conditions would also require assessment.

WHO should encourage such studies in a small number of carefully selected areas. They should be designed to make the findings comparable with those of other investigators, and a diarrhoeal disease advisory team should give guidance and assistance, as well as co-ordinating the work of the different investigators. The importance of the detailed planning of co-ordinated epidemiological studies needs no emphasis. This is the proper responsibility of the investigators themselves, but the individual or group opinions of epidemiologists, clinicians, nutritionists and others who have taken part in studies of the diarrhoeal diseases should be obtained. Complete record forms for comparative studies should be developed, laboratory procedures should be adopted after consultation with enteric microbiologists in different countries, and high quality reagents should be used. Finally, consultative guidance in statistical analyses should be sought so that observations are properly presented.

Treatment and prevention

When an infant has diarrhoea, the first thing to do is to prevent dehydration. If the doctor sees him after he has passed only a few liquid stools, he should prescribe fluids, as long as the child is not vomiting, to offset those lost from the body in the stools and at the same time to provide for daily minimum maintenance needs. These fluids, may be in the form of a simple salt and sugar solution, to be offered *ad libitum*. Unnecessary dietary restrictions should be avoided, so as not to aggravate the malnutrition that is so frequently present. Purgatives should not be given.

If this treatment is insufficient, or if the child is first seen in a state of dehydration, intravenous fluid should be given under medical supervision in a hospital. Fluids given by hypodermoclysis or by gastroclysis may be helpful and even essential if there is no alternative, and the success of these methods in a few out-patient " rehydration centres " suggests that they might be used in local health units if supervision by qualified personnel is possible. The more remote the local health centre from the hospital, the greater the importance of its being well equipped. During the child's return to health oral sugar-electrolyte solutions should be given.

The need for a continuous, vigorous programme for the prevention of disease and the promotion of health is often forgotten in the ever-present concern with emergency treatment. There should be repeated instruction and demonstrations in the rudiments of personal hygiene, home sanitation, and the choice, storage and preparation of food; advice to the mother during pregnancy; help in the home following the birth of the baby; and instruction in the early recognition of illness, including the diarrhoeal diseases and dehydration. Breast-feeding should be encouraged, and attention paid to the addition of solid food before the infant reaches the age of 6 months, as a first step in weaning him to an adequate and balanced diet. This should be followed by the progressive integration of his diet with that of the family.

Preventive measures in the control of the diarrhoeal diseases include the management of contacts and carriers. When the incidence is low, discovery of the source of an outbreak may with profit be followed by drug treatment of all infected persons. Where the incidence is high, drug treatment can only be a partial approach to the problem, and has little or no justification from the public health standpoint. In many parts of the world routine

immunization may well include protection against typhoid fever, but not against shigellosis, the vaccine for which has been uniformly unsuccessful.

Adequate qualified staff is needed to carry out measures for the treatment and prevention of the diarrhoeal diseases. The Study Group believed that there should be an expansion of maternal and child health services through the creation of medical centres in both rural and urban areas: not solely for the management of infantile diarrhoea, or for its prevention, but as an integral and important part of the total community health programme.

The importance of environmental sanitation

The decline of the diarrhoeal diseases during the last century in some countries has been largely attributed to improvements in environmental sanitation. These include the provision of adequate and safe water supplies; sanitary facilities for the disposal of excreta; the prevention of the pollution of ground and surface water supplies by faeces, and of the carriage of faecal particles by vectors such as flies; housing with enough space to prevent excessive crowding; the freeing of dwellings from rodents and other vermin and from domestic animals; and sanitary control of the production, processing, storage, and consumption of milk and other foodstuffs. The mode of spread of the diarrhoeal diseases is essentially by the anal-oral route. Infection may be direct from person to person, through fomites, through vectors, or through the consumption of contaminated water, milk, or foodstuffs. Parasitic infestation which may contribute to the diarrhoeal diseases may arise from contact with polluted soil. Animal reservoirs may be of importance in some infections. Environmental sanitation interposes barriers to the spread of infection from all these sources.

Recent studies have shown that a significant improvement in the standard of environmental sanitation may be obtained by certain selected measures. It has, for example, been shown repeatedly that fly control reduces the morbidity from the prevalence of *Shigella* infection in children. Should insecticide resistance develop, basic measures must again be used: flies must be prevented from gaining access to human faeces, and their control achieved by the removal of the environmental conditions that favour their multiplication. Studies in the USA and in Guatemala have likewise shown the importance of supplies of safe water in the prevention of the diarrhoeal diseases. The probability that selective modification of factors in the environment will reduce the incidence of these diseases should be tested in a number of geographical areas and in differing cultural groups, and the relative importance of the factors assessed; but the evidence is already sufficiently strong to justify initiating selective environmental control programmes. Diarrhoeal disease advisory teams should be able to draw on expert sanitary engineering advice.

Research

As indicated, the effectiveness of specific environmental control measures needs critical evaluation, and additional observations are required on the effect of increased availability of water on the incidence of the diarrhoeal diseases. Research is needed into the possibility of a mass programme for the prevention of deaths from dehydration, and into the early use of oral sugar-electrolyte solutions in episodes of infant diarrhoea. The value of rehydration units in local health centres at some distance from hospitals calls for study. A disturbingly high proportion of diarrhoeal diseases are still of unknown etiology. Among the agents incriminated are the enteric viruses. Because the technical procedures are so exacting and the cost of virological studies so high, investigations must be carried out selectively; but they should be carried out as expeditiously as is practical because of the importance of these viruses in the diarrhoeal diseases of animals and because filterable agents have been shown to cause disorders of this kind in man. Other subjects calling for study are the inter-relationship of malnutrition and infection in the diarrhoeal diseases, and the role of intestinal parasites.

Important services are being rendered by

the international reference centres set up by WHO—the International *Salmonella* and *Escherichia* Centre in Copenhagen, the International *Shigella* Centres in London and Atlanta, Ga.—and the network of national *Salmonella* and *Shigella* centres, in identifying organisms, in supplying preparations of strains and sera for the purpose of identification, and in giving advice on the preparation of typing sera and on isolation techniques. These services do not include the supply of reagents for routine diagnosis or the specification of standardized diagnostic procedures, which would be of value in comparisons between the bacteriological data obtained in the different areas selected for special studies. Uniform reagents might be supplied by a central service to national laboratory centres, which would be the focus of bacteriological work in each individual study and would redistribute the reagents and give technical advice to the participating field units. In this way the work done with uniform reagents would yield comparable data, on which future recommendations for uniform diagnostic procedures might be based. A limited initial programme like this would form a basis for the future extension of similar services to diagnostic laboratories throughout the world. The supplying laboratory and the national laboratories working in close contact with the field units need not necessarily be those already in the network of international and national centres, but close consultation between the different centres should always be maintained.

Further knowledge of the diarrhoeal diseases will require as well the engagement of sufficient qualified staff for the work of investigation and research. Also, because many disciplines are involved in the study and control of the diarrhoeal diseases, the work must everywhere be co-ordinated to a much greater extent than at present.

A NEW APPROACH TO IMMUNOLOGY

The preservation over many years of collections of human blood will enable the biologists and medical and public health workers of the future to study diseases by reference to present immunological patterns. This bold new approach to immunology has been described by Dr A. M.-M. Payne, Chief Medical Officer, Virus Diseases, WHO, in a paper presented at an International Symposium on Epidemiology held at Prague, Czechoslovakia, from 22 to 27 February 1960, by the Czechoslovak Society of Microbiologists and Epidemiologists. This paper is summarized below.

Epidemiological methods were first applied to the study of communicable disease. Indeed, to many the word " epidemiology " came to be synonymous with the study of communicable diseases, and especially of epidemic diseases, in populations. At quite an early stage, however, epidemiological methods were also applied to the study of certain non-communicable diseases, notably nutritional disorders (scurvy, beri-beri, pellagra and goitre, for example), and certain occupational cancers.

The results of epidemiological studies conducted within individual countries do not always hold good for other countries. Even within a given country the application of current findings to explain past events or to forecast future trends is fraught with difficulty. And yet it is above all in this direction that epidemiology has its greatest contribution to make.

Two examples drawn from different fields will suffice to illustrate this. If young men continue to smoke cigarettes heavily until later life a considerable proportion will die of lung cancer. They can be warned and with efficient educational measures the risk may be largely averted. Many other forms of cancer may be preventable in a similar way. In poliomyelitis, as socio-economic develop-

ment proceeds, the risk of the disease occurring in epidemic form increases; epidemics will inevitably occur sooner or later unless preventive vaccination is introduced. Other virus diseases are also changing their epidemiological pattern owing to man's interference with his environment and, when this is so, preventive measures must be developed in good time. Epidemiological studies can provide warning of impending trouble.

Studies of this type have resulted in the general acceptance of two principles. First, there is the importance of studying change in the behaviour of a disease within a population over a period of time and the relationship of that change to changes in possible ecological factors. Secondly, there is the importance of comparing differences in the behaviour of a disease in different populations at the same time, so that the influence of race, environment, socio-economic conditions and other factors may be discerned.

There is a third principle which has not perhaps been as widely appreciated and that is the importance of collecting and storing in stable form material relevant to disease problems so that it will be available for study by new techniques and in connexion with new problems that will certainly arise in the future, and also help to define the changing pattern of disease in years to come.

WHO has recently studied an approach to the application of all these three principles which has certain novel features. This approach is the subject of the present article.

A branch of epidemiology which has received increasing attention in recent years is *serological epidemiology*. Early examples were the study of Wasserman reactions in different population groups. In the nineteen-thirties the first important geographical surveys of the prevalence of antibodies to yellow fever were carried out by the Rockefeller Foundation and resulted in the demonstration of the existence of jungle yellow fever. Later, in the nineteen-forties, serum surveys were used for mapping the geographical distribution of the arthropod-borne encephalitides, and soon afterwards they were applied to poliomyelitis, at first using the only technique available at the time—the Lansing neutralization test in mice—but happily some of these collections were stored and were re-examined later, using tissue culture techniques, with most rewarding results. For example, J. R. Paul and his colleagues, using their collection of Eskimo sera, were able to show that poliomyelitis antibodies persist in the absence of reinfection for many decades. More recently some investigators have examined the sera collected using batteries of tests, thus obtaining information regarding several diseases at little extra cost.

Blood contains many substances other than antibodies, the examination of which is of public health importance and of scientific interest. Haematological and biochemical investigations are of great importance in the study of certain chronic diseases, including cardio-vascular disease and anaemias, and of over- and under-nutrition, human genetics and hereditary abnormalities. WHO therefore convened a Study Group to consider the practical problems of the multi-purpose approach to serological and haematological surveys, and, in addition, to make proposals for the establishment of an international system of serum reference banks so that material collected in these surveys could be preserved under optimum conditions and released for investigations of international significance in the future.

The Study Group, which consisted of a statistician, a virologist, a bacteriologist, an epidemiologist, a veterinarian, a biochemist and an expert on abnormal haemoglobins, met in December 1958 and its report has now been published.[1]

As far as was possible in the five days of its meeting, the Study Group discussed all the major aspects of the subject. Its report contains sections on: studies on the blood of man and animals in which survey methods are indicated; the uses and limitations of serological surveys; methods of sampling the population; technical considerations regarding the methods of collection, shipment and treatment of blood for multi-purpose examination; collection of epidemiological information relevant to the survey; recording and reporting results; recommendations for

[1] *Wld Hlth Org. techn. Rep. Ser.*, 1959, **181**

the development of multi-purpose surveys and of international collections of sera; and the criteria for the release of such collections for future research.

Subjects which lend themselves to study by serological and haematological surveys fall into several categories, of which four major ones may be considered: immunological studies on the past and present prevalence of infections in man and animals; genetic studies, such as those on blood groups and abnormal haemoglobins; studies of anaemias of various types; biochemical studies, especially those related to nutrition, such as the determination of plasma proteins and cholesterol.

For practical reasons two types of survey are envisaged: (i) specific surveys initiated to obtain answers to specific problems, on to which may be grafted (ii) multi-purpose surveys from which information can be obtained concerning two or more of the fields listed above.

Thus the team undertaking the survey for a specific purpose would also collect specimens suitable for other determinations and for proper storage of aliquots for future reference, conceivably ten to twenty years hence. As already pointed out, such collections would have great value in the study of the spread of newly recognized disease and in the utilization of new tests which may be devised for previously known diseases (e.g., hepatitis) or which may have a bearing on biochemical, haematological or genetic problems.

Clearly, at first at least, the surveys will usually be planned for a specific purpose, concerned with some immediate problem. It must be shown that a multi-purpose survey will not interfere with the primary purpose, that it will not seriously increase the cost of the field work, that it will not make co-operation of the population more difficult to obtain (e.g., by requiring a disproportionate number of specimens) and that it will yield additional information of value both for immediate and future health problems. All this requires a careful study of local problems and interests, and careful design of the sampling procedures to suit the various requirements.

The report of the Study Group contains a list of conditions on which such surveys could throw light, which will be invaluable in persuading local authorities to adopt this new approach.

It also contains a section on the uses and limitations of these surveys. For example, studies of immediate application include the determination of the susceptible groups in a population which may need vaccination, and the gathering of information on the geographical distribution of infectious agents, which is of obvious practical public health importance to enable the authorities to initiate the appropriate preventive measures.

Long-term studies may be carried out by repeated cross-sectional surveys or by a longitudinal survey in which the same sample of the population is repeatedly examined at appropriate intervals. Each of these has advantages for different purposes, the former being generally more practical though the latter can be more informative if the serological results are collated with a record of clinical illness covering the same period.

It is however necessary to emphasize that serological surveys have their limitations and yield information on only part of the total ecological picture, albeit an important part. Other investigations will nearly always be needed to complete the story, but even so the serological survey will often indicate what these should be and how they should be carried out. Difficulties may arise from cross-reacting antibodies and from the failure of certain antibodies to persist, though the latter may sometimes be an advantage, as when the complement-fixing antibody indicates recent infection whereas neutralizing antibody in the absence of complement fixation indicates remote infection. Lack of reproducibility or sensitivity of the test may cause trouble and introduces problems of standardization of techniques and reagents which are currently being investigated by WHO. Difficulties may also be experienced through the presence of non-specific inhibitors or neutralizing substances. However, these disadvantages do not seriously impair the value of serological surveys, provided appro-

priate precautions are taken in their planning and conduct, and in the interpretation of the results.

The greatest problem associated with multi-purpose surveys as proposed is the method of sampling the population. The Study Group paid particular attention to this point.

In the past there has been a tendency to select a population for a particular survey on the basis of preconceived ideas about the epidemiology of the disease concerned. While it is not suggested that previous knowledge or theory should be ignored in selecting a sample, it is now recognized that the assumption that such theory is fact can introduce a serious degree of bias which will invalidate the results or at least make them very difficult to interpret. It is better to design the survey so as to test the validity of preconceived ideas. In order to do this and to avoid bias, even for a survey for a specific purpose, rigorous random sampling procedures must be adopted in the final selection of the individuals to be bled and this is of course essential in multi-purpose surveys.

However, difficulties arise in the choice of areas in a region or country from which the final samples are to be taken. There are two main methods, one being the random selection of areas from the whole region to give a statistically valid sample capable of furnishing objective estimates for the whole population, the other being to choose at random among typical areas from selected and contrasting parts of the region. The latter will not of course give estimates valid for the whole region, and averages derived from the findings must be recognized as of uncertain accuracy. However, for most purposes the information will provide a reasonable picture of the general situation throughout the region and the contrasts which become apparent between the different types of area are likely to be much more clear-cut and illuminating than when a random selection of areas from the whole region is made. The reason for this is that many areas randomly selected in this way are likely to be of an intermediate type where the situation is necessarily confused. Furthermore, if the incidence of a condition is found to be similar in areas selected from contrasting parts of the region, it is reasonable to conclude that it is much the same for the whole region, whereas if it differs markedly the variations are likely to be of more interest than any precise determination of the average value for the whole region.

It should however be emphasized that, having chosen contrasting parts of the region, the areas to be sampled within these parts should be selected by some random method and it is useful, as an additional precaution, to include more than one area from among those believed to be typical of a given set of conditions.

The size of the sample required in a survey depends greatly on the type of information required and the degree of detail hoped for. The report discusses the well-known formula for the standard error in quantal determinations which are those most usually used in these surveys. Taking all factors into account, the Study Group considered that a suitable sample size for the population groups between which it is desired to make comparisons is 300-600, and an example is given, which has often been used successfully, consisting of 25 samples for each annual age group up to and including the age of 4, 50 samples for each five-year age group from 5 to 19, 50 samples for each ten-year age group from 20 to 39, and 50 samples from persons over 40. For some purposes the last will be insufficient, and when that is so it would be advisable to continue 50 samples per decade up to perhaps the age of 69.

In deciding the size of the sample required for any purpose, the magnitude of laboratory and other non-sampling errors that are likely to affect the results should be borne in mind. There is no point in using very large samples where these errors are large and cannot be reduced by standardization of techniques and reagents.

The Study Group stressed the importance of including animal populations in these studies. Many human diseases are primarily zoonoses, and human infections, though grave, may be ecological accidents of no significance for the survival of the infectious agents. A true understanding of these

diseases and their control is impossible without the study of the wild and domestic animal populations concerned, and serological epidemiology can contribute much to this.

After discussing technical considerations in respect of the methods of collection, shipment and treatment of blood specimens for multi-purpose examination, the Study Group came to the conclusion that for the tests now contemplated a total of approximately 26 ml of blood from each person would be required:

1. *Clotted blood*—20 ml, producing approximately 10 ml of serum for immunological studies. This should be separated on the day of collection, shipped cold but not frozen, and stored at the lowest possible temperatures, preferably −70°C, or, perhaps even better, lyophilized in 0.5 ml or 1 ml amounts in neutral glass ampoules. However, the optimum method of storage so as to preserve different antibodies has still to be determined.

2. *Oxalated or citrated blood*—6 ml, 0.5 ml of whole blood being required for haematology, and a similar quantity for blood groups. Plasma for biochemical tests and packed red blood cells for haemoglobinopathias would be obtained from the remainder of this specimen, separation being carried out at the site of collection. The packed red cells should be shipped by air at 4°C, the plasma if possible frozen on dry ice or, if that is not available, at −5 to −10°C, obtained by mixing salt with ice.

These recommendations are of course subject to alteration after further study in practice. Every effort has to be made to devise the simplest possible methods compatible with satisfactory results and with the minimum processing at the site of collection. A pilot study in this connexion is now in progress in Kenya, and plans are being made to study the stability of different types of antibody and other substances under different conditions of shipment and storage.

If, as is recommended in the interests of convenience and sterility, vacutainers are used for the collection of blood, both types of specimen can be collected from a single venipuncture, using two separate vacutainers, one of which contains oxalate, with an adapter for multiple sampling.

It is clear that the collection and recording of relevant epidemiological information are much more difficult in multi-purpose surveys than in surveys for specific purposes. This is doubly true when specimens may be stored and examined perhaps twenty years later. It will be difficult to ensure that all information that might possibly be wanted has been recorded. A great deal of study will be needed to draw up appropriate forms and devise recording techniques, which should be designed for machine processing. The Study Group therefore included in its report only the broad headings under which special items of information should be recorded.

Few will doubt the potential value of international reference collections of sera, if wisely established and administered. In the opinion of the Study Group, pilot studies are necessary to test the recommended techniques; collaborative studies of laboratory techniques must be undertaken to determine which are the most satisfactory, simple and reproducible; tests and reagents need to be standardized, storage methods investigated, methods of recording studied, and the design of forms, punch cards, etc. undertaken; and finally and most important of all the co-operation of specialized laboratory workers and epidemiologists must be enlisted because, without it, it will be impossible to obtain, examine, or store material. Information should be obtained regarding the collections of sera already held in different laboratories and agreement solicited for the release of suitable collections for the purposes outlined here. This will entail sacrifices which some workers will be unwilling to make. But the flow of material will be a two-way flow in this programme. Laboratories contributing material will eventually be able to obtain in exchange other specimens perhaps more suitable for their research programmes. The experience of WHO in the influenza programme, in which co-operating laboratories have willingly sacrificed, in the interests of international health, their right to study in detail the virus strains which they have

isolated, shows that this co-operation can be achieved.

The programme in only beginning. One of WHO's first steps has been to select two leading laboratories which have long been interested in serological epidemiology to act as international centres at which serum banks will, it is hoped, eventually be established. Professor R. Raska has agreed in principle to the establishment of one such centre in the Institute of Epidemiology and Microbiology, Prague. The other centre which has been selected is the laboratory of Professor John R. Paul in the Department of Epidemiology and Public Health at Yale University. Other centres will probably be needed as the programme develops.

It is hoped that if epidemiologists and microbiologists agree that these ideas are basically sound they will do their utmost to co-operate with WHO and the two international centres in the healthy development of this programme, which appears to have great potentialities.

BLACK-FLIES AND ONCHOCERCIASIS

The flies of the genus *Simulium*, usually called black-flies or buffalo-gnats in English-speaking countries, affect man and animals both by their biting habits and by their role as vectors of parasites. In large areas of Africa, some districts of Central America, Venezuela, and perhaps other South American countries, species of this genus are vectors of human onchocerciasis. Over a much larger area, including parts of Canada, the USA and Europe, they are an extreme nuisance because of their biting habits and enormous numbers; in the USA, for example, they used to put a stop to the tourist trade in the Adirondacks between May and July, and control measures became necessary in this area. *Simulium* has also created difficulties in the exploitation of fertile lands in Africa and Central America, not only because of the fear of onchocerciasis and onchocercal blindness, but also because, to avoid the ferocious biting of the black-flies, people refuse to work on the construction of dams, on irrigation systems or on the land. Populations have been forced to emigrate to other areas, and depopulation, famine, soil erosion, even social conflicts in territories where the emigrants were not welcome have resulted.

Heavy losses among domestic and wild animals have also been caused by *Simulium*. Animals have been affected in the river basins of Germany, along the Danube, in forested parts of Siberia, in Australia, Canada, the USA and South America, and include mules, horses, cattle, sheep, hogs, dogs, cats, deer, foxes, rabbits, turkeys, chickens and ducks. In Romania in 1923, for instance, more than 16 000 domestic animals were killed by *S. columbaczense*, in addition to an unestimated but certainly large number of wild animals.

Simulium transmits different parasites to different animals, one being *Onchocerca gutturosa*, a filarial worm that attacks cattle and causes severe economic losses in Australia. Another transmitted protozoiasis affects turkeys and ducks.

Different species of *Simulium* appear to have preferences for different parts of the human body. The North American black-flies are reported to bite man mostly on the upper parts of the body, even crawling under clothing and hats to feed. The head and upper parts of the body are also preferred by *S. ochraceum*, the principal vector of onchocerciasis in Guatemala and Mexico, while *S. damnosum*, the most important vector in most areas of onchocercal endemicity in Africa, bites almost entirely on the legs. These preferences appear to be correlated with the distribution of the " nodules " containing the adult *Onchocerca* worms in the person infected: in Central America they are chiefly found on the head and upper parts of the body, in Africa in the pelvic area and lower parts of the body.

Black-flies breed in running water, and both in Africa and in America control programmes are based on the introduction of such larvicides as DDT into breeding rivers and streams in quantities lethal to the larvae; but spraying has also been used in addition against adult black-flies, for instance in the Adirondacks. Control presents a very different problem in each area. In Quebec and in the Adirondacks the black-flies breed in the many streams, the country is difficult and the undergrowth dense, and roads and trails are absent; insecticide is therefore sprayed from the air. In Africa *S. damnosum* is generally a large-river species, and the breeding places are normally accessible from the ground, so that insecticide can be introduced into the main streams, the small tributaries, which generally are free of the larvae, being left untouched. The breeding places of *S. ochraceum* in Mexico and Guatemala are the most difficult to control, because the country consists of heavily fissured mountains with steep sides, covered with almost impenetrable tropical forest. Here aerial spraying is impossible, because the insecticide would never penetrate beyond the forest canopy, and the inaccessibility of the country and the abundance of streams make it exceedingly difficult to treat the breeding areas with insecticide.

With such different behaviour on the part of the black-flies, it is not surprising that there are striking dissimilarities in the epidemiology of onchocerciasis in America and in Africa. In Mexico and Guatemala, the disease is associated with coffee-growing areas and occurs in restricted zones in forested country between 450 and 1500 m above sea level. In Nigeria, the endemic areas have such hazy limits that the term " zone " is inapplicable; the disease is not associated with altitude or with plantations, and it is found both in savannah and in forest country. In Mexico and Guatemala the distribution of the vector black-flies is much more extensive than the distribution of onchocerciasis, whereas in Nigeria they are co-extensive. Finally, the infection rate in the black-fly is much lower in Mexico and Guatemala than it is in Nigeria, a difference that no doubt is reflected in the number of sufferers from onchocerciasis in the two areas: in Mexico this is estimated at 35 000-50 000, in Guatemala at 25 000, and in Northern Nigeria alone at a third of a million.

The author of an article in a recent issue of the WHO Bulletin,[1] who has visited America as a WHO fellow to study black-fly control and problems of onchocerciasis, concludes from his comparison of American and African conditions that control should be based on a reasonable working knowledge of the biology of the local species, which may be different for the same species in different countries and under different conditions. Careful entomological studies are therefore essential for the planning of control measures in each area.

[1] Crosskey, R. W. (1959) *Bull. Wld Hlth Org.*, **21**, 727

Production of live poliovirus vaccine

" . . . even if the current impressions of the safety and (in certain epidemiological situations) the effectiveness of the [live poliovirus] vaccine should be confirmed, there are still problems of ensuring the consistent production of a safe and effective product which must be solved before its public health use on a large scale can be advocated. A meeting of an expert committee is planned for 1960 to consider the present position and to make recommendations as to the manufacture and use of the vaccine."

Annual Report of the Director-General of WHO (*Off. Rec. Wld. Hlth Org.*, 1960, **98**, 14)

INTERNATIONAL WORK IN HEALTH STATISTICS, 1948-1958*

10. Some general trends

A brief mention has already been made of the statistical work initiated by the Health Organisation of the League of Nations, which greatly encouraged countries to introduce or to expand systems for the collection and publication of health statistics.[1] It published a series of handbooks on the statistics of a number of countries, and sponsored much statistical work on such matters as nomenclature, classification, field studies, and the collection and publication of the results of surveys, all of which are dominant features of present-day health programmes.

When WHO took the place of the Health Organisation of the League of Nations, governments and a number of non-governmental organizations pressed for previous international work to be continued and expanded. It was recognized that sound international health policies and programmes were dependent upon countries providing adequate statistical and other data, and upon the application of sound statistical methodology. It has been the purpose of the present review to show how WHO has attempted to meet the demand made on it for services in these technical fields.

At first, quite understandably, the emergency conditions immediately following the Second World War gave considerable prominence to communicable diseases, malnutrition and dislocation of local health services. Even these emergencies could not be met without the guidance given by health statistics. When this phase passed, the role of health statistics became even more important. In most WHO activities during the past ten years planning has come to be seen as dependent upon adequate statistical data and upon a better understanding of the epidemiological factors operating in each country and region. Conversely, the marked gaps in the completeness and accuracy of health statistics in many regions and the incomplete understanding of the epidemiological circumstances of many causes of ill health and disease resulting from this situation have been seen to be a serious obstacle to the efficiency of the health services provided by individual countries.

In the early days of WHO the study of the communicable diseases (such as cholera, malaria, and tuberculosis) was predominant. Latterly, although epidemiological problems in communicable disease have continued to be exceedingly important, greater attention has begun to be paid to the study of non-communicable conditions, such as cancer. The work of the League in achieving greater comparability of statistics of incidence and prevalence of cancer from country to country has been continued and expanded by WHO, with the help of the national committees on vital and health statistics. Other non-communicable conditions of interest have been circulatory conditions, malnutrition and accidents.

Any proposal made to WHO for an international health programme has usually followed the same pattern. It has been recognized that any assistance to governments is administratively and technically faulty unless its full extent and implications are known. Invariably, therefore, the technical groups called together by WHO to advise on programmes have requested improved statistical information from countries, and asked WHO to arrange for this to be collected and analysed.

Again and again in the period described in the present review the priority to be given to the improvement of national statistical systems has been emphasized. WHO has played a large part in encouraging countries to recognize their responsibility for collecting adequate data on their health conditions,

* This is the last part of an account of WHO's work in international health statistics. Earlier parts appeared in *WHO Chronicle*, 1959, **13**, 67, 214, 253, 378, 417, 446; 1960, **14**, 66, 116, 146.

[1] See *WHO Chronicle*, 1959, **13**, 70.

and to use the procedures and technical methods recommended by the various WHO expert groups. Statistical services in countries are being improved through seminars (conducted usually in co-operation with the United Nations), the visits of consultants, and the training of local staff through WHO fellowships. This basic work has been furthered by the appointment of statistical officers to the staffs of four of the WHO regional offices. These experts have helped local administrations to understand the role of epidemiology and statistics in the development of their own national health services.

Much of the work in statistics undertaken by countries individually or in combination would be haphazard or self-defeating but for the procedures, nomenclatures and classifications devised by the WHO Expert Committees on Health Statistics and the International Conference of National Committees on Vital and Health Statistics. Under the auspices of WHO the exceedingly important seventh revision of the International Lists of Diseases and Causes of Death has been prepared and made available to countries through a manual published in several languages.

Another noticeable trend has been the increased willingness of countries to use statistical methods for the more accurate determination of the causes of mortality and morbidity. The detailed lists of the earlier decennial revisions of the International Lists had been recognized as suitable for countries with well-organized statistical systems. In recent years, however, it has been accepted that these detailed lists are of less use to countries lacking proper statistical services. Valuable contributions to the solution of the statistical problems of such countries have been made by the WHO expert committees; they have devised, for example, short lists and sampling procedures, and shown how the analysis of hospital statistics and other morbidity returns could be put to use in obtaining data of value.

This more intensive study of morbidity data is another tendency now noticeable. In the last decade health administrations have found it increasingly necessary to base their policies on indices of morbidity as well as of mortality, if not more so on the former. The difficulties of morbidity statistics have consequently become the subject of study. Recent Expert Committees on Health Statistics have attempted to give some guidance, but have recognized that the nature of the subject makes international study of morbidity returns inevitably more complex than the study of mortality returns. Nevertheless, several principles have been defined. Some of the conditions have been laid down which must precede the use of morbidity data, whether taken from hospital returns or general practitioner records, or collected in pilot schemes or experimental areas. Much research work, however, especially under field conditions, is required. Here again, the national committees are giving much assistance. Modern statistical methodology is of great value in dealing with the problems arising in the use of morbidity statistics, and is being made more widely available through training courses (developed by WHO) in the use and limits of small samples, in the control of clinical and field experimental studies, and in the general techniques of analysing numerical data.

WHO has inherited from the League the obligation to publish the data it receives on mortality and morbidity from a number of important conditions. During the decade, these returns have been under constant review, and every occasion has been seized to persuade countries to send in more complete and accurate returns, based wherever possible on one of the lists given in the latest decennial revision of the International Classification. A further obligation has been to make these data available to all those who may be interested in it. WHO has maintained the regular publication of these reports, incomplete and inaccurate though many returns from countries have been. The very publication of obviously incomplete returns is arguably a stimulus to better returns being prepared. World data, available through WHO publications or, in the case of vital statistics, in the companion publications of the United Nations, are essential for international organizations assisting countries to

organize their health services, as well as for institutions and individuals undertaking research into epidemiological and statistical matters of world or regional concern.

Numerical data are not the only contributions WHO has been able to make in this field. Equally important is the information collected in specific epidemiological studies or surveys. Epidemiological inquiry, it will be recalled from the examples given elsewhere in the present study, has increased in prominence in WHO programmes. Many projects launched by WHO in response to requests by governments for assistance now have an epidemiological component: for example, those dealing with malaria, brucellosis, rabies, trachoma, tuberculosis, and such conditions as diarrhoeal diseases, malnutrition and mental diseases.

Data from such projects, apart from their use in guiding local programmes, are increasingly being added to medical knowledge by publication in WHO technical journals or, on occasion, in national journals. As the phase of direct assistance to countries in establishing their own basic health services decreases in relative importance, this tendency is likely to become more marked. International scientific data will be gathered and published increasingly continuously and regularly for use by technical and administrative groups everywhere.

The modern world depends more and more on a complexity of organization which sets a premium on statistics, and there is little likelihood of any decrease in the demand made on WHO for its services in epidemiology and health statistics. The growing complication of modern industrial and urban life must also make health programmes increasingly dependent upon epidemiological guidance. It is perhaps not going too far to see in many present-day circumstances an indication of the future importance of epidemiology and statistics. Populations, whether of humans, insects, parasites or micro-organisms, are living, changing groups which are continually interacting with each other and, in turn, being influenced by any variation in their general environment. This being so, no description or analysis of disease in a human population serves for all time: there are too many variable factors existing in the circumstances of any particular disease in a human community ever to justify complacency. Man's conquest of so many of the diseases that mystified and appalled his ancestors has, paradoxically, presented him with new problems. The reduction in the plagues of the past has unleashed forces the extent of which has still to be revealed. A world contracted in space and made one by technology, industrialization and urbanization is bound to produce new and unpredictable disease patterns. Even if the traditional hazards of such diseases as cholera, plague and smallpox are avoided, there is a distinct possibility of new infections and new hazards, radiation and other, emerging. The future role of virus infections is also difficult to predict. Whatever form, therefore, human communities of the future may take, it is unlikely that they will be able to dispense with international health statistics if they desire efficient health services.

Malaria eradication in Europe

" Mopping up the last cases is the task facing European malaria workers today. If in 1962, after 11 million square miles have been cleared and 686 million people protected, 'The End' can be projected on the European malaria screen, our continent will be the first to throw off the shackles of the world's most costly disease. Then Europe will be able to devote even more of its scientific and humanitarian resources to driving malaria from the other continents."

Dr PAUL J. J. VAN DE CALSEYDE, WHO Regional Director for Europe

Epidemiological and Statistical Information

LEADING CAUSES OF DEATH IN SELECTED COUNTRIES

Ranking deaths from each cause in numerical order is a popular method of presenting mortality statistics. Though it has its limitations, it is the best method for answering the question " What are the most frequent causes of death? ", and the information obtained is useful in planning action to reduce mortality. The fact that only a few causes of death account for a large proportion of all deaths is of great significance, since specific measures undertaken to reduce mortality due to these causes might considerably lower the general mortality.

In a study published in the WHO *Epidemiological and Vital Statistics Report* [1] causes of death have been ranked on the basis of the average annual (1954-1956) number of deaths assigned to 41 single categories, or groups of categories, of the abbreviated list of 50 causes of death found in the seventh revision of the International Statistical Classification of Diseases, Injuries, and Causes of Death.[2]

The following countries were selected for this study:

Canada	Netherlands
United States	Norway
Denmark	Sweden
Finland	Switzerland
France	United Kingdom
Germany	Australia

It has been for a long time the practice of these twelve countries to issue statistics of causes of death.[3] They also have good medical services, on which adequate registration of causes of death depends so much.

The following interesting facts emerge from the study:

1. The ten leading causes of death are responsible for more than 75% of deaths in the selected countries, except in the Federal Republic of Germany and in France, where the proportion is somewhat lower, being 68.8% in the first and 62.7% in the second.

2. Heart disease,[4] malignant neoplasms, vascular lesions affecting the central nervous system, and accidents are the most common causes of death in the selected countries, which represent the developed areas of the world today.

3. Heart disease appears as the leading cause of death in practically all countries studied. One quarter to over one third of deaths are due to this cause in practically all these countries except Germany (19.7%) and France (18.1%). Malignant neoplasms are the second most frequent cause of death, being responsible for between 14.3% and 21.6% of all deaths. Vascular lesions affecting the central nervous system rank third (11-16%) in all countries. Deaths due to accidents are in the fourth place (4.5-6.9% of all deaths) in all countries except England and Wales, Northern Ireland, and Sweden, where they rank as the fifth or sixth cause of death.

[1] *Epidem. vital Statist. Rep.*, 1959, 12, 109

[2] World Health Organization (1957) *Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death, 1955 revision*, Geneva, p. 381

[3] In the United Kingdom, separate statistics are issued for England and Wales, Scotland, and Northern Ireland.

[4] The following groups are included in " heart disease ": chronic rheumatic heart disease; arteriosclerotic and degenerative heart disease; other diseases of heart; and hypertension with heart disease.

Pneumonia is the fourth cause in Sweden, and the fifth in England and Wales and all the other countries except Denmark, Finland, and Scotland, where it ranks sixth.

The above-mentioned five causes of death together account for roughly two-thirds of all deaths. They therefore indicate the major fields where life might be saved in the population as a whole.

By age group

The leading causes of death vary greatly for different age groups.

In the *age group under one year*, birth injuries, postnatal asphyxia and atelectasis rank first as causes of death. Congenital malformations are second and pneumonia is third.

In the *age group 1-4 years* the leading cause of death is accidents in all the countries selected. The proportion of deaths caused by accidents at this age is, for these countries, on the average about 30% of deaths due to all causes; and the specific death rate is about 35 per 100 000 population. In England and Wales, the proportion and the rate are relatively low (21%, and 20 per 100 000 population). The same is true for France and Northern Ireland (15.4% and 19.7%, 26.7 and 21.1 per 100 000 population, respectively). Pneumonia is the second and congenital malformations are the third cause of death in this age group.

In the *age group 5-14 years*, as in the previous age group, accidents are the first cause of death. They are responsible for an average of 38% of all deaths during this period of life in the countries selected, though the proportion ranges between 49.6% in Canada and 27.9% in France. The death rate varies from 11.8 per 100 000 population in France to 32.0 in Canada, with an average of slightly less than 19 per 100 000 population. Malignant neoplasms occupy the second place in all the countries selected. On the average, the proportion of deaths due to this cause is 13.8% of all deaths, ranging from 11.4% in Canada to 15.9% in England and Wales. The average death rate is 6.4 per 100 000 population, with the lowest level, 5.7, in Scotland, and the highest, 7.7, in Norway. Congenital malformations hold third place. Pneumonia is in the fourth place in most of these countries, nephritis and nephrosis fifth.

In the *age group 15-44 years*, accidents remain the most frequent cause of death for all the countries selected except Denmark, the Netherlands and the United Kingdom. In the first two countries and in England and Wales they are the second most frequent cause, and in Scotland and Northern Ireland the third. The lowest death rate from this cause is in Northern Ireland (19.8 per 100 000 population), the highest (49.0) in Canada, the United States, and Australia. The proportion of deaths caused by accidents varies from 13.7% (Northern Ireland) to 30.9% (Canada) of all deaths in this age group, with a median proportion of 22.5%.

Malignant neoplasms generally appear in the second position, except in the United States, where they rank third, and in Finland, where they are fourth. In Denmark, the Netherlands, and the United Kingdom they top the list. The death rate varies from 23.2 per 100 000 population in France to 32.4 in Scotland, with an average of 27.5. Though the death rate is the highest in Scotland, yet malignant neoplasms cause only 19.5% of all deaths registered there in this age group. The average proportion is 18.1%, ranging between 12.5% for France and 25.7% for the Netherlands.

Heart diseases do not drop below the fourth place as a cause of death in this age group. In the United States, Scotland, and Northern Ireland, they occupy the second. The death rate varies from 9.3 per 100 000 population in Norway to 33.0 in the United States, causing 7.4% of all deaths in the former and 17.3% in the latter.

Tuberculosis appears as the second cause of death in Finland, the third in France, and the fourth in Norway, the Netherlands, and the United Kingdom. In the other countries it has a lower rank, ranging between fifth and eighth.

It is interesting to note that suicide and self-inflicted injury appear as the third, fourth or fifth cause of death in this age group, except in the cases of Scotland, where it drops to

seventh, and Northern Ireland, where it occupies the tenth position.

Though pneumonia is among the ten leading causes of death in all the countries except Denmark, it comes at the tail of the list.

In the *age group 45-64 years*, heart diseases, malignant neoplasms and vascular lesions affecting the central nervous system are the first three leading causes, but the order varies in different countries.

Heart diseases are the first cause of death in Canada, the United States, Finland, Scotland, Northern Ireland, Sweden and Australia, and the second in the other countries. The lowest death rate is that of France (153.4 per 100 000 population), the highest that of the United States (478.5). Heart diseases are responsible for 13.9% of all deaths in France, and 40.4% in the United States.

In countries where heart diseases are the first cause of death, malignant neoplasms are the second, and *vice versa*. Malignant neoplasm death rates vary considerably from one country to the other. Sweden has the lowest rate (220.6 per 100 000 population), and Scotland the highest (340.4). Malignant neoplasms are responsible for between 20.5% and 34.0% of all deaths in the selected countries.

Vascular lesions affecting the central nervous system are the third cause of death for this age group in all the countries selected, but the death rates vary between 69.4 per 100 000 population in Denmark and 145.6 in Scotland. The proportion of deaths due to this cause also varies between 8% and 12.9% of all deaths.

Accidents attain the fourth or the fifth position in all countries but England and Wales, where they are sixth.

It is interesting to note that bronchitis appears as the fourth cause of death only in the United Kingdom, and is not among the ten leading causes in the other countries, except in the Netherlands, where it is seventh.

In the *age group 65 years and over* the same three most frequent causes of death appear as in the previous age group, and in general in the same order. Heart diseases cause in some of the countries more than 40% of deaths in this age group (United States 46.5%, Canada 42.4%, Australia 40.7%). The lowest proportions are in France (22.1%) and Germany (22.7%). In all other countries the proportion is between 30% and 40%.

Vascular lesions affecting the central nervous system are second, except in the Netherlands and Denmark, where they are third. These two causes are responsible for more than half the deaths in this age group.

Malignant neoplasms are the third cause (12.3-19.2% of all deaths), except in the Netherlands and Denmark, where they occupy second place. The three causes just mentioned account for more than two-thirds of all deaths.

Pneumonia appears again in this age group as the fourth cause in most countries, and the fifth in the others (United States, Denmark, England and Wales, Scotland, and Switzerland).

Accidents hold the fourth position in the United States, Denmark, and Switzerland, and drop to fifth in the other countries, except for the United Kingdom where they are sixth.

In this last age group, bronchitis comes fourth for England and Wales and Scotland, fifth for Northern Ireland.

SUICIDE: A NEGLECTED PROBLEM

The incidence of suicide is on the whole low in the less developed countries, high in the more; and in some countries of very high living standards it has become a problem of considerable proportions. Between ages 15 and 44, it is the second most important cause of death in Japan, the third in Germany, Denmark, Sweden and Switzerland, and the

fourth in Canada, Australia and the USA. It is also an important cause of death between ages 45 and 64. The table below, extracted from recent numbers of the WHO *Epidemiological and Vital Statistics Report*, gives the number of deaths from suicide for certain years, and the mortality rate per 100 000 population from this cause for one of those years, in a number of countries which furnish WHO with statistics on suicide.

	*Deaths from suicide (1954-1956 *)*[1]		*Mortality rate from suicide per 100 000 population (1955)*[2]
	Males	*Females*	
Canada	2 637	794	7.1
USA	38 893	10 950	10.2
Japan	39 700	25 520	25.2
Belgium	1 762	658	13.6
Denmark	2 060	1 008	23.3
France	15 983	5 471	15.9
Italy	6 447	2 754	4.8
Norway	607	150	7.4
Netherlands	1 221	743	6.0
Sweden	2 909	941	17.8
Switzerland	2 346	931	21.6
United Kingdom (England and Wales)	9 436	5 889	11.3
Australia	2 176	760	10.3
New Zealand	397	149	9.0

* Except in the cases of Belgium (1954-1955), and Italy, Sweden and New Zealand (1953-1955)

In the USA some 16 000 people commit suicide every year, as compared with 14 000 who die from tuberculosis and 40 000 who die from motor accidents; in England and Wales the number of suicides, approximately 5000 annually, is nearly as great as the number of those who die from pulmonary tuberculosis, and slightly exceeds the number who die from motor accidents. More men commit suicide than women, and as age increases the preponderance of male suicides becomes greater.

Durkheim, in his classic study of suicide,[3] divided suicide into three types: the altruistic, in which the individual's life is rigorously controlled by the customs and beliefs of a rigid society and he commits suicide for religious or political reasons; the egoistical, in which he is insufficiently integrated into society; and the anomic, in which he is insufficiently regulated by society and his adjustment may be upset by economic catastrophes or sudden wealth. Examples of the first type are to be found in the ritual suicide practised in some primitive societies and in Japan. Social disorganization certainly tends to increase the incidence of suicide and may change the pattern: thus in Hong Kong the disintegration of the traditional culture of Chinese society has led to a shift in the incidence of suicide, formerly at its peak in the thirties for men and twenties for women, to a new peak in old age for men and during the menopause for women. But an inherent disposition also plays an important part. The stresses of loneliness and friendlessness act with selective severity on those predisposed to mental illness (to depressive psychosis in particular), and these are often the individuals who commit suicide, whereas others without the inherent predisposition do not. Cause and effect are not easy to distinguish. Do individuals who commit or attempt suicide drift into isolated environments because of the illness that drives them to take their own lives, or are certain environments conducive to suicidal tendencies? Alternatively, is loneliness both a consequence of mental ill health and a factor increasing the chances of suicide? The whole problem of suicide is extremely complex, the causes not very well understood.

Further progress in the study of suicide, according to Professor Martin Roth,[4] is unlikely until statistical investigations are combined with detailed individual clinical studies, along socio-psychological lines, of the problems of social integration and cohesion. In these studies aspects on the relative importance of which light needs to be shed are: bereavement, loneliness, poverty, awareness of declining faculties, decreasing vitality, impairment of physical health, and mental disease. Others, especially in younger people and in attempted suicide, are guilt feelings

[1] *Epidem. vital Statist. Rep.*, 1958, 11, 364
[2] *Epidem. vital Statist. Rep.*, 1959, 12, 345
[3] Durkheim, E. (1897) *Le suicide*, Paris
[4] *Bull. Wld Hlth Org.*, 1959, 21, 527

and a desire for self-punishment, hopelessness and fear of the future, aggressive feelings, and the wish, not to die, but to bring about a change in the attitude of some other person. Finally, there is the apparent motivelessness of some suicides or attempted suicides, linked perhaps with the "death wish" of Freud. Statistical data about suicide are among the most clear-cut epidemiological facts in the whole field of psychiatry, and should lend themselves to intensive inquiry. We might then be able to understand more clearly why there are striking differences in incidence between the more and the less developed countries, between communities of different religious denominations, and between urban and rural areas. We might also perhaps be in a better position to prevent attempts at suicide, and provide those who have attempted but failed with efficient aftercare or social support. And we might be able to decide whether those who actually commit suicide and those who merely attempt to do so are distinct groups of individuals, as they sometimes appear to be.

Not until comprehensive studies are made of suicide, nationally and internationally, will it be possible to take the most suitable action to reduce the number of deaths from this cause.

SMALLPOX IN 1959

According to provisional notifications, about 72 000 cases of smallpox were reported officially in the world (outside continental China) in 1959, as against 243 000 in 1958 (see map). This decline in the total number of cases is due to a decreased incidence in India and East Pakistan where, following the unusually high levels of 1958 (about 216 000 cases), only 50 000 cases were notified.

However, outside India and Pakistan, there was little decline in smallpox incidence. In the remainder of Asia, and in Africa and South America, there were about 22 000 cases, as compared with 27 000 in 1958.

In Europe, imported infection from Asia caused 19 cases in January at Heidelberg, Germany. A case imported from India was notified in East Berlin and an isolated case was registered at Liverpool, England. In the USSR, one case was notified at Termez, Uzbekistan.

This information is taken from the WHO *Weekly Epidemiological Record* (No. 8, 1960).

CHOLERA IN 1959

According to a recent number of the WHO *Weekly Epidemiological Record* (No. 3, 1960), less than 42 000 cases of cholera were officially reported in Asia in 1959, as compared with about 98 000 in 1958.

In India the situation was probably the best on record, less than 14 000 cases being notified provisionally as against 67 000 in 1958 (see map on page 200). About 60% of all cases in India occurred in the lower Ganges valley.

In East Pakistan, about 5300 cases were notified during the first nine months of the year, but a sharp rise was recorded in October reaching a peak incidence of about 1400 cases during the first week of November. According to provisional telegraphic notifications 20 095 cases (with 12 683 deaths) were reported during the year as against 16 741 (10 623 deaths) in 1958.

In Thailand, where the disease was present from May 1958, the incidence decreased slowly from the middle of March 1959 and the last cases were reported during the first week in October. In all, 7777 cases (with 625 deaths) were notified there in 1959.

SMALLPOX — VARIOLE
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BURMA
950
THAILAND
1550
LAOS
VIET-NAM
FED. OF MALAYA
SINGAPORE
INDONESIA
552
PORTUGUESE INDIA
IRAQ
KUWAIT
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SAUDI ARABIA
MUSCAT AND OMAN
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CÔTE FR. DES SOMALIS
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UAR EGYPT
SUDAN
577
KENYA
RUANDA URUNDI
1428
TANGANYIKA
CONGO BELGE
2483
ANGOLA
FED. OF RHODESIA AND NYASALAND
733
MOZAMBIQUE
BECHUANA LAND
BASUTOLAND
SOUDAN RÉP.
701
NIGER
1112
NIGERIA
1557
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CAMEROUN
HAUTE VOLTA
DAHOMEY
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TOGO
581
CÔTE D'IVOIRE
LIBERIA
SIERRA LEONE
GUINEE
GAMBIA
GUINEA
SÉNÉGAL
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COLOMBIA
854
ECUADOR
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Reports of Expert Groups

The epidemiology of cancer of the lung *

A WHO Study Group [1] met in Geneva in November 1959 to review what is known of the etiology of cancer of the lung, and to suggest ways and means of increasing our understanding of the causative factors.

Cancer of the lung is more prevalent than it was. Official statistics in a large number of countries show a steady increase in the mortality and morbidity rates, and although part of the increase must be ascribed to a greater awareness of the possibility of the disease and so to improved diagnosis it is generally accepted that most of the increase is real. Even in countries where the mortality rates are still relatively low, the tendency is towards an increase.

On the whole, evidence is in favour of the assumption that cigarette smoking is a major causative factor in the increasing incidence of cancer of the lung. While some of the criticisms of this interpretation of the evidence suggest avenues for further research, none can be considered to cast serious doubt on it. Cigarette smoking cannot however be regarded as the only possible factor of etiological significance. In all countries the incidence of cancer of the lung is higher in urban than in rural areas, and much evidence has been adduced to support the view that pollution of the atmosphere by smoke is another factor of possibly great importance to be taken into account. Chemicals known to be carcinogenic to animals, particularly 3:4-benzpyrene and other polycyclic hydrocarbons, have been found in the air of towns wherever samples have been analysed. Air pollution appears to have decreased and to be decreasing in many countries, and it is desirable that variations in the amount and kind of pollution should be examined before conditions become completely changed. What evidence exists at present on the part played by air pollution in the causation of cancer of the lung appears to indicate that it is or can be a factor of some importance, though it appears to be of less importance than cigarette smoking.

While the parts played by cigarette smoking and by air pollution are still hotly debated, there is no controversy over the increased risk of lung cancer among certain workers in industry. This was first established in the late nineteenth century for miners of radioactive ores, and has been shown to exist for workers engaged in the refining of nickel, the manufacture of chromates and asbestos, and the production of illuminating gas. The incidence of lung cancer is also higher among workers exposed to inorganic arsenic (particularly in concentrations sufficient to produce arsenical dermatoses), and it has been suggested that it is increased by exposure to or association with printing ink, iron dust or fumes, the manufacture of isopropyl oil and beryllium, and the mining and smelting of copper ore. Although it appears to be unlikely that all the industrial risks of lung cancer have been discovered, the contribution of industrial lung cancer to the total incidence is quite small. Nevertheless, a more exact knowledge of the conditions under which these industrial processes cause cancer would probably shed light on the mechanism of carcinogenesis in man.

Many other factors have been held to play a part in the causation of lung cancer: among them ionizing radiations from non-industrial sources, chronic pulmonary disease (especially when it produces scarring and metaplasia), and heredity. Sources of ionizing radiations include the decay products of radium and

* WHO Study Group on Epidemiology of Cancer of the Lung (1960) *Report* (*Wld Hlth Org. techn. Rep. Ser.*, No. 192), 13 pages. Price: 1/9, $0.30, Sw. fr. 1.—. Also published in French and Spanish.

[1] Members of the Study Group: Dr R. Doll, United Kingdom (Chairman); Professor L. M. Shabad, USSR (Vice-Chairman); Dr H. F. Dorn, USA (Rapporteur); Dr M. L. Levin, USA (Rapporteur); Professor L. Kreyberg, Norway; Dr E. A. Saxén, Finland; Mr D. Schwartz, France; Professor M. Segi, Japan; Mr R. E. Waller, United Kingdom. Secretariat: Dr E. Pedersen, Norway (Consultant); Dr J. S. Peterson, WHO; Dr B. Pirc, WHO; Dr Helen E. Pogosianz, WHO (Secretary); Dr P. Stocks, United Kingdom (Consultant).

thorium, radioactive isotopes dispersed in nuclear explosions, and radioactive potassium and carbon in the body, as well as radiations from diagnostic radiography and radiotherapy and the small amount from cosmic rays. The evidence at present is insufficient to warrant any conclusions about the effect of these forms of radiation on lung cancer.

The same may be said of heredity. Extensive studies of malignant tumours suggest a genetic basis for susceptibility, but do not invalidate the evidence accumulated in favour of environmental factors.

There appears to be some evidence of association between lung cancer and chronic bronchitis and mucosal changes in the bronchi, but the interpretation of this evidence is uncertain. Retrospective studies have failed to reveal any significant association with healed tuberculosis, and follow-up studies have not been sufficiently extensive or prolonged to detect one. We do not know what part, if any, previous respiratory infection plays in increasing the risk of contracting the disease.

Other possible factors that have so far received little consideration are air pollution in dwellings caused by domestic heating and home industry, and substances affecting the bronchi that are absorbed from the skin or alimentary tract.

Increasing our knowledge of lung cancer

In different countries there are marked variations in the mortality from lung cancer, and in several countries where it was previously infrequent mortality is on the increase. Consequently, the Study Group urged, there should be high priority for epidemiological investigations into the reasons for variations, and particularly into the reasons for the increase in incidence. Special attention should be paid to the extent to which already identified etiological factors may be responsible for this increase.

In some of the countries where the increase in incidence has been marked, the frequency of epidermoid and oat-cell carcinomas has been observed to have increased disproportionately more than that of the other histological types of lung tumour. Professor Kreyberg, of Norway, who has been placed in charge of the International Centre for Lung Tumours established by WHO in Oslo, has suggested that epidermoid and oat-cell carcinomas be classified together as Group I tumours and other types of lung cancer as Group II tumours. The ratio of Group I tumours to Group II tumours may, as studies already indicate, be a sensitive index of an increase in the incidence of environmentally caused lung cancer as between two or more population groups. Where the necessary diagnostic facilities are available, the Study Group felt, studies of the relative incidence of lung cancer should be undertaken by means of the histological techniques developed by the International Centre. Studies are particularly needed in areas where vital and health statistics are not available or where there is reason to believe that lung cancer has begun to increase. The value of these studies would be much enhanced by the simultaneous collection of data about known or suspected etiological factors. As representative a sample as possible should be taken of cases in a defined population or area, one way of securing this being to obtain data on all new cases diagnosed during a specified period of time.

In some parts of the world where reliable vital statistics are not available, medical care and diagnostic facilities may be sufficiently developed for special morbidity studies of lung cancer, like those on the incidence of cancer among the Bantus of South Africa and among negroes in Uganda and Mozambique. Information about newly diagnosed cases and possible etiological factors can be obtained from doctors, pathologists and hospitals. This type of study has the advantage that incidence rates are obtained for cancer of each specific site as well as for all forms combined, and the further advantage that the information is about populations as yet unaffected by modern industrial conditions.

Even between countries in which the increase in the incidence of lung cancer began some time ago, there are large differences in rates of incidence. While this is possibly explicable in some cases on the ground that

habits of life and extent of industrialization are different, this explanation will not account for the variations between countries where conditions are more or less similar, such as Finland and Norway: in Finland the death rate from cancer of the lung is about five times as great among males as in Norway, nearly twice as great among females. Epidemiological studies should be made of factors that may influence these variations.

Only in exceptional circumstances is it possible to conduct planned experiments on human beings to test hypotheses about the etiology of a disease. Clearly, because of the danger to health and because observations would be required over a period of years, they could not be carried out for cancer of the lung. In default of experiments, groups of people might be identified and studied who for some reason or other are exposed to an excessive degree, or on the contrary are hardly exposed at all, to a factor thought to influence the incidence of a disease. Do such groups exist for cancer of the lung? At least one does, in the shape of the Seventh Day Adventists in the United States of America, a religious sect which is prohibited from drinking alcohol or smoking tobacco. There is at present a study being made of several thousand Seventh Day Adventists in parts of California where air pollution is a major problem. Similar groups undoubtedly exist in other parts of the world, and there are also groups of persons particularly exposed to a specific agent: workers exposed, for instance, to the exhaust fumes of gasoline or diesel engines or to the distillation products of coal. In studies of these groups, information must be obtained on the incidence of lung cancer in the population of which they form part so that a comparison can be made with the general population, and the groups must be large enough to yield a sufficient number of cases to make a comparison possible. In many countries studies would be facilitated if the primary site of cancer were entered in social insurance and pension records for industrial workers, which already usually contain information on occupation.

Cancer of the lung is believed to be caused by multiple factors, so that the simultaneous study of these factors in populations known or thought to be significantly exposed to them is a valuable approach to the problem of etiology. It should be borne in mind that current cases of lung cancer are probably due to agents operating twenty to forty years ago; information is therefore needed on the time individual members of the group were first exposed to the separate factors to be studied which would include air pollution, the use of tobacco (particularly in cigarettes), and occupational hazards. Widely contrasting environments should be represented; cooperation should be available from an agency with qualified personnel; reliable mortality statistics by age and sex must exist; more than one city in each country or cultural area should be included; and the mobility of the population in each city should be taken into account. Provided that standard techniques are agreed upon, the analysis of air pollution can be carried out in more than one laboratory.

While exogenous factors appear to be responsible for the increase in the incidence of lung cancer, genetic traits may, at least in part, determine who will develop the disease. Genetic studies of twins may also throw light on the role of environmental agents. International collaboration would obviously be needed for studies of twins to produce an adequate number of cases.

Epidemiological studies of a disease like cancer of the lung as a rule single out general factors that affect the incidence, the identification of the specific agents responsible being carried out by laboratory and experimental investigation. This investigation, the Study Group felt, must be encouraged, and it stressed the desirability of standardizing laboratory and experimental methods and of conducting experiments, whenever possible, under conditions reproducing the manner of exposure of a human population.

Although much remains to be done in elucidating the causes of the disease, the Study Group held the opinion that there is sufficient well-established knowledge of the etiology of cancer of the lung to justify prophylactic action aimed at the reduction of exposure to known etiological agents.

Insecticide resistance and vector control *

The tenth report of the WHO Expert Committee on Insecticides [1] is essentially concerned with practical problems involved in the combating of insecticide resistance, especially with the establishment of standard test methods for determining the susceptibility or resistance of insects. Some modifications have been introduced in the procedures for adult and larval mosquitos on the basis of experience gained so far. It is recommended that the existing standard method for body lice should continue to be used for the present but that two alternative methods, which may show certain advantages, should be submitted to trial. Provisional test methods have been drafted by the Committee for bed-bugs, fleas, and sand-flies, and it is recommended that these should be tested extensively in the field. Tentative methods were also considered for black-fly larvae, tsetse flies, and cone-nosed bugs, but these have not yet been developed to the point where provisional methods can be drafted. In the bio-assay of insecticidal deposits on wall surfaces, extensive trials have shown the conical exposure chamber to be superior to the dish type and its use in the standard method is therefore recommended.

The report discusses the definition and use of the term " behaviouristic resistance ". In the strict sense, this should be reserved for populations the behaviour of which has been changed by selection in avoiding lethal doses of an insecticide. It has been more loosely applied to the increased irritability to DDT shown by certain insect populations.

A suggestion that pyrethrum might be a useful alternative to chlorinated hydrocarbon insecticides in cases of resistance was examined by the Committee. Owing to its short residual effect, its value is limited to situations where a rapid knock-down and transitory control are all that is required, and it was agreed that, for the present, it would be sufficient if up-to-date information on the role of pyrethrum in vector control be made generally available.

The eight annexes to the report include, in addition to detailed methods for detecting and measuring resistance, a revised version of " Recommended methods for vector control ".

* WHO Expert Committee on Insecticides (1960) *Tenth report : Insecticide resistance and vector control* (*Wld Hlth Org. techn. Rep. ser.*, No. 191), 98 pages. Price: 3/6, $0.60, or Sw. fr. 2.—. Also available in French and Spanish.

[1] Members of the Committee: Dr S. Asahina, Japan; Dr J. R. Busvine, United Kingdom (Chairman); Dr J. Hamon, Republic of the Upper Volta; Dr R. Pal, India (Vice-Chairman); Dr H. F. Schoof, USA (Rapporteur). Secretariat: Dr A. W. A. Brown, Canada (Consultant); Dr R. W. Fay, WHO; Mr C. Garrett-Jones, WHO; Dr M. Giaquinto, WHO; Mr K. Uemura, WHO; Mr J. W. Wright, WHO (Secretary); Dr J. de Zulueta, WHO.

Notes and News

Transport of gonococcus cultures

Until the beginning of the Second World War, the culture method was not extensively used in the diagnosis of gonorrhoea, being confined to places where the clinical services had associated laboratory facilities. Then the rapidly increasing incidence of the disease, particularly among soldiers, made better diagnosis and control desirable. As microscopical diagnosis was difficult, it became necessary to use the culture method to a greater extent than before. This has frequently meant the long-distance transport of samples to the diagnostic laboratories.

The transport of material to be tested for the growth of gonococci presents special problems of preservation. Desiccation and exposure to sunlight must be avoided, and the consistence, composition and pH of the transport medium cannot be left to chance.

Over the past twenty years, various methods have been advocated for the transport of gono-

cocci in conditions that will ensure their survival. In a report recently presented to the WHO Expert Committee on Venereal Diseases and Treponematoses,[1] Alice Reyn, B. Korner & M. W. Bentzon review the principal methods published and give the results of comparative trials of two of them: the McLeod and Stuart [2] methods. In these trials, natural clinical specimens and artificial specimens prepared with pure gonococcus cultures were used. Transport conditions, varying in nature and duration, were simulated.

The comparison showed the superiority of the Stuart method, which involves the use of a non-nutrient medium. This medium can also be used for the transport of other bacteria. To avoid the inconvenience of a semi-fluid medium, the authors increased the agar concentration—to 1.2% for Bacto agar, and to 1.8% for Japan agar.

Psychotropic drugs and psychotherapy

Do psychotropic drugs help in individual psychotherapy? R.A. Sandison, writing in a recent issue of the *Bulletin of the World Health Organization*,[3] is of the opinion that they do. Jung, he says, condemns the use of these drugs on the ground that they diminish the patient's power to integrate unconscious material; others hold the view that if tranquillizers are used the patient's anxiety and aggression, which would otherwise force him to continue treatment, are reduced to the extent that, although not cured, he stops the treatment. Against these arguments Sandison maintains that it is by no means clear that tranquillizers do produce a true fall in the total aggressive drive of the individual: many patients receiving mild tranquillizers experience an increase of energy and creative ability following a reduction in their anxiety and tension. Because less preoccupied with their symptoms, too, these patients may be better able to take part in their own treatment. No doctor would refuse analgesics to patients in pain. There seems to be some inconsistency between the willingness to reduce pain and the unwillingness to reduce anxiety, tension, and insomnia.

Some of the tranquillizers are valuable in individual psychotherapy because they enable the patient to discuss his situation in a relaxed frame of mind. He talks more easily, and memories on the fringe of consciousness make their way into speech, so that an emotionally charged complex may be uncovered. Where psychological trauma has been recent, the drugs may bring about abreaction. Major tranquillizers, particularly the phenothiazines, are successfully used in the long-term maintenance of schizophrenics. Sandison has treated a number of schizophrenics in this way, mostly with chlorpromazine, and some are in their fourth year of treatment and the majority are out of hospital. In his view chlorpromazine keeps thought disorder under control, thus preventing the resultant affective disorder; if it is given to an acute psychotic, the thought disorder and hallucinations clear up first, then the affective disorder. On moderate doses of chlorpromazine schizophrenics can thus be treated as out-patients, even though the schizophrenia is at a fairly advanced stage.

Another drug Sandison discusses at length, lysergic acid diethylamide (LSD), is not a tranquillizer at all, but a hallucinogenic drug. The value of abreaction in treatment is a matter of controversy. A dangerous or frightening experience in which an adult is unable to express his fear, as for example, in battle, may become the starting-point of a neurosis. Under the influence of drugs he may re-live the experience, which this time may be accompanied by the appropriate emotional response; this abreaction may have a good effect on the condition. Whether or not the psychologically traumatic incident has been forgotten, the value of abreaction lies in the release of the emotion with which it has become associated, the incident being re-assessed in the light of the patient's mature emotional judgement. LSD appears to Sandison to be the most suitable agent for bringing about abreaction.

Sandison also discusses the role of the tranquillizers in group psychotherapy.[4] Some patients, he found, who might have been forced to give up LSD treatment were undoubtedly helped to

[1] Unpublished working document INT/VD/129

[2] Stuart, R. D. (1946) *Glasg. med. J.*, **27**, 131; Stuart, R. D. (1956) *Canad. publ. Hlth J.*, **47**, 114; Stuart, R. D., Toshach, S. R. & Patsula, T. M. (1954) *Canad. publ. Hlth J.*, **45**, 73

[3] *Bull. Wld Hlth Org.*, 1959, **21**, 495

[4] *Bull. Wld Hlth Org.*, 1959, **21**, 505

continue because they were being treated in a group.

The psychotropic drugs thus have some therapeutic value, although the indications for their use—Sandison emphasizes—are as yet imprecise. Most clinical trials give results that are too favourable to the drugs under test. One reason is that the spontaneous improvement rate of a similar untreated group of patients is not accurately estimated. Another is that methods of measuring improvement are inadequate and vitiated by the observer's conscious or unconscious bias. A third is that the trial is influenced by the placebo response. Sandison's opinion is that a better knowledge of the psychotropic drugs will be obtained if trials are properly designed and controlled and use the "double blind" procedure and appropriate rating scales. The pressure exerted by drug manufacturers on clinicians to carry out rapid clinical trials should be resisted at all costs; patients should be placed on placebos for weeks or months before the drug is introduced. Editors of medical journals should insist that authors use the drug for at least a year before submitting a paper on it for publication. The first few trials at any hospital should be regarded with suspicion because of the placebo response. Group meetings should be held in wards where clinical trials are proceeding and the attitude of the staff and patients ascertained, for all the uncertainties and errors of the trials lie within the emotional lives of the staff; so the effect of the size of the staff and of the training and the personality of each of its members must be assessed, and a study made of the patients' daily lives and the comparative frequency of parole and leave. The evaluation of all these factors is an extremely difficult task. Nevertheless, until more objective studies of the social factors influencing a clinical trial are published along with the results of the trial, not enough will be known about the real efficacy of the drugs, and physicians will continue to be bewildered by their alarming profusion.

Typhoid vaccine antigens

The strictly controlled field trial of typhoid vaccines in Yugoslavia in 1954-55 [1] was the first of a series of trials aimed at determining the protective value of typhoid vaccines and finding a laboratory test that would enable the immunizing potency of a vaccine for man to be assayed on animals. One of several important questions requiring an answer was that of the respective roles of the H, O and Vi antigens of *Salmonella typhi* in immunization.

In two articles, which will shortly be published in the WHO Bulletin,[2] Standfast compares the results of potency tests on the typhoid vaccines used in the trial, which were carried out at the Lister Institute of Preventive Medicine, Elstree, England, the Central Institute of Hygiene, Zagreb, Yugoslavia, and the Walter Reed Army Institute of Research, USA.

These tests showed that the results of vaccine assays in mice by the methods at present in use were unsatisfactory. Responses in humans showed differences between the various vaccines which could not be distinguished in the assays in mice. The reason for this may be that protection in man depends on quite different factors from protection in mice. It appears that, in their present forms, mouse tests do not even measure the essential protective antigen, whatever that may be.

While the administration of vaccine in various ways to mice was unhelpful in classifying vaccines according to their potency, agglutination tests showed that the H antigenicity of the phenolized vaccines was markedly higher than that of the alcoholized vaccines, which had shown themselves considerably less potent in the field trials.

Tests of the immunological properties of a number of strains of *S. typhi* showed that it is possible to protect mice against Vi-positive strains of *S. typhi* by means of a strain without Vi antigen (strain T 5501). This strain is stable, and able to maintain its Vi-negativity after several mouse passages, whereas other Vi-negative strains revert to the Vi-positive state after one or a few mouse passages. The immunity conferred by the live T 5501 vaccine is as lasting as that conferred by a killed vaccine containing the Vi antigen. While the killed T 5501 vaccine also confers immunity, it is not as satisfactory as a killed Vi-positive vaccine. These findings confirm those of other studies which suggest that the Vi antigen might not be the essential antigen for protection against typhoid fever.

[1] *Chron. Wld Hlth Org.*, 1956, **10**, 161; 1957, **11**, 373

[2] Standfast, A. F. B. (1960) *Bull. Wld Hlth Org.* 23 (In press)

Bornholm disease in Upper Silesia

In the summer of 1957 a small epidemic of Bornholm disease broke out in Bytom, Upper Silesia, Poland. The epidemic cases differed from the sporadic cases of the disease that had occurred in previous years both in clinical development and in causation. The chief symptoms in the epidemic were severe pain in chest and abdomen, headache, vomiting and sweating; the commonest complication was dry pleurisy. In a recent issue of the WHO Bulletin K. Gibiński et al.[1] describe some of these cases and the results of virological analysis.

Whereas the earlier sporadic cases had been caused by a type A Coxsackie virus, those of the 1957 epidemic were due to type B; of the cases studied virologically 30% had been infected with Coxsackie virus of type B_3, as was shown by neutralization tests in tissue cultures. Complement-fixation tests confirmed these results. No type A strain was isolated during the epidemic among the 107 cases diagnosed. The viruses were isolated from the stools and from throat swabs, and only on HeLa cells; the strains were non-pathogenic to newborn mice.

A fresh examination in tissue culture of Coxsackie strains isolated from the earlier sporadic cases confirmed that they belonged to type A.

Thus, within a short time, a change occurred in the type of virus circulating in the population.

Endemic goitre in Basutoland

A survey has been made by a WHO nutrition team of the prevalence of endemic goitre in Basutoland. Some 13 000 people of both sexes and all ages were examined, representing about 2% of the population. Goitre development was assessed according to the criteria established in 1953 by the Third FAO/WHO Conference on Nutrition Problems in Latin America. Of those examined 46.6% belonged to the age group 1-12, 46.4% to the age-group 13-18, and the rest to older groups.

The survey showed that goitre exists throughout the whole country. The prevalence varies in the different districts, but is everywhere well above the 10% at which endemic goitre is generally accepted as constituting a public health problem; indeed, for the whole territory the average is 41%. The percentage of cases increases with age, regardless of sex, and diffuse goitre is more prevalent than nodular. The population regularly, and at times in large quantities, consumes foodstuffs thought to be goitrogenic, but eats very little salt (at most 5 g daily). The high incidence of goitre in the age-group 0-12, associated with a consumption of foodstuffs that are possibly goitrogenic, shows that the level of iodization should be raised above the 150 μg generally recommended as a daily dietary allowance. Experience in Canada, the USA and Latin America has shown that 650 μg of potassium iodate added to a daily salt consumption of 6.5 g per head prevents endemic goitre, and no iodine intoxication or cancer of the thyroid has been reported with this intake. In Basutoland, therefore, with an average consumption of 5 g of coarse salt per head per day, a level of iodization should be recommended at not more than one part of potassium iodate to 10 000 parts of salt and not less than one to 20 000 parts.

A report on this survey appeared in a recent issue of the WHO Bulletin.[2]

Scientists engaged in research on drinking-water quality

In February 1960, WHO published its third list of scientists engaged in research on drinking-water quality. It contains the names of 184 persons from 27 countries working on 247 research projects, together with an addendum containing names just received as the list was ready for distribution.

The list is in two parts. Part I contains an alphabetical list of scientists, together with descriptions of the research projects on which they are working. Part II contains a list of the subjects recommended for study by the WHO Study Group on International Standards for Drinking-Water; under each subject are listed the names of workers engaged on research

[1] *Bull. Wld Hlth Org.*, 1960, **22**, 421

[2] Muñoz, J. A. & Anderson, M. M. (1959) *Bull. Wld Hlth Org.*, **21**, 715

connected with it. In each case full particulars on the scientist and the exact nature of his research can be found by referring to Part I.

One of the chief values of this document is the opportunity it affords for those engaged on related research, but in different laboratories, to get into direct touch with each other. Copies of the list are obtainable on request from the Division of Environmental Sanitation, WHO Headquarters, Geneva.

Nursing in the Americas

At the invitation of the Government of the Argentine Republic and under the auspices of WHO, a Regional Congress on Nursing was held from 25 to 31 October 1959 in the Faculty of Medicine of the National University of Buenos Aires. This congress, the fifth of its kind to be held in the Americas, was attended by representatives of nearly all American countries.

The main topic discussed was nursing legislation. It was pointed out that, as nursing is extremely important from the point of view of human well-being, there is a need for nursing legislation which will at the same time protect the community and regulate professional training, practice and administrative control. Such legislation should be general in character and sufficiently flexible to be adapted to social changes. As a first step, a strong, well-organized national nursing association should be set up in each country. These associations would have to have the necessary financial means and legal status, and all professional nurses would have to belong to them.

One of the main subjects of legislation should, of course, be the professional training of nurses and auxiliary nurses: the minimum requirements at each level of training should be stipulated, taking local possibilities and needs into account. The provisions should, as far as possible, conform with international criteria.

Attention was drawn to the need for setting up—within the competent official body in each country—a committee composed of qualified professional nurses, which would be responsible for the administrative control of nurses and for the application of the legislative provisions. There should be precise regulations governing the functions of each category of nursing staff, beginning with the higher nursing posts in the public health services, which should be filled by competitive examination. An administrative control body should be established to keep a register of active personnel and to issue and renew diplomas.

Finally, in order to strengthen national nursing associations, it was recommended that more information be circulated on the aims and rules of these associations. In the first place, the public should be made aware of the importance of the nursing profession and the need for an increasing number of professional nurses. Secondly, nurses should maintain close contact with other nurses in their own and in other countries, and keep abreast of scientific progress affecting their profession. Both these aims could be achieved by the creation of a nursing information journal for the Americas.

International courses on radiation protection

During March and April, the WHO Regional Office for Europe assisted in two international courses on protection from atomic radiation, held in the Federal Republic of Germany and in France. The first, which took place at the Radiological Institute of the University of Freiburg-im-Breisgau, from 2 to 25 March, was an introductory course on the public health aspects of radiation protection. WHO fellowships were granted to 11 public health officials from Austria, Czechoslovakia, Italy, Romania, Turkey, and Yugoslavia to enable them to attend the course.

The second, held at Saclay, France, from 7 March to 15 April, was an advanced course on radiation protection for public health officials. It was organized by the French Commissariat à l'Energie atomique, and 14 WHO fellows from Austria, Belgium, Bulgaria, Czechoslovakia, France, Italy, Luxembourg, Poland, Portugal, Romania, Spain, Switzerland and Turkey attended.

These courses were part of a series organized by the WHO Regional Office for Europe starting in 1955. The earlier courses were held at Stock-

holm (1955), Mol, Belgium (1957), Oxford/Harwell (1958, 1959) and Saclay (1956, 1958, 1959).

World Health Day, 1960

"World Health Day this year is devoted to the world's most costly disease, malaria, and the world campaign for its eradication.

"Never before in history have the nations concerted their efforts on such a scale against a single disease. Without a dissenting voice the ninety Members of the World Health Organization have resolved to pool their knowledge and resources to achieve nothing less than the complete elimination of this disease from our globe . . .

"Malaria remains in 1960 a constant threat to more than 1000 million human beings. For the most part these are people who already have more than their share of sickness and poverty, and can least afford to be further weakened in their struggle against misfortune . . .

"Today we know how malaria is transmitted, and by what mosquitos. We know how the malaria parasite behaves within the human body, and how it causes a fever that may lead to death. We have found effective ways of destroying the mosquitos and we possess drugs that successfully attack the parasites within the human body. The techniques for fighting malaria are continually becoming more powerful and precise.

"But we know also that the deadly mosquitos have found ways of fighting back—that is why speed is essential. The campaign against malaria must be carried through while the weapons still remain effective. There must be no slackening of effort until the disease has been entirely stamped out, and the last remaining case in the remotest corner of the earth has been tracked down and cured . . .

"There is no doubt in my mind that the countries of the world are today in a position to accept this challenge. To do so indeed is a question of honour. What is needed more than anything else is the will to eradicate malaria, for today the way is there."

The above statements are taken from a special message issued by Dr M. G. Candau, Director-General of WHO, in connexion with this year's World Health Day, which had as its theme "Malaria eradication—a world challenge". World Health Day is observed each year on 7 April to mark the anniversary of the coming into force of the Constitution of the World Health Organization in 1948.

People and Places

WHO assistance to Morocco in Agadir disaster

Dr Melville Mackenzie, formerly director of the epidemiological services at the Ministry of Health, London, has been appointed by the WHO Regional Office for Europe as adviser to the Government of Morocco on the organization of post-emergency health services in the earthquake-stricken port of Agadir.

Dr Mackenzie was a member of the Health Committee of the League of Nations and has been concerned with epidemic control in Russia (1921-1923), in Greece (1928-29), in China, in the eastern Mediterranean area, and in London during the Second World War. He was Chairman of the Committee which set up UNRRA (the United Nations Relief and Rehabilitation Agency). On several occasions, Dr Mackenzie led the United Kingdom delegation to the World Health Assembly; he was Chairman of the WHO Executive Board at its twelfth and thirteenth sessions (1953-54).

Technical discussions at Thirteenth World Health Assembly

The technical discussions at the forthcoming Thirteenth World Health Assembly will be concerned with the role of immunization in the control of communicable disease. Professor R. Cruickshank is helping WHO with the preparations for these discussions, in which delegates from some 80 Member States are expected to take part.

A preliminary questionnaire prepared by Professor Cruickshank has been circulated to all

Member States and interested organizations. In addition, Professor Cruickshank had taken part in preparatory meetings organized by the WHO Regional Offices for Europe and South-East Asia and by the International Children's Centre, Paris. As a result of these activities, a considerable body of information has been collected: this will be analysed and collated by Professor Cruickshank and used in a background document for the guidance of participants in the discussions.

Professor Cruickshank was appointed to the Chair of Bacteriology in Edinburgh University in 1958, having held a similar post at St Mary's Hospital Medical School, University of London, from 1949. From 1949 to 1956 he was first Deputy Principal and then—on Sir Alexander Fleming's retirement in 1955—Principal of the Wright-Fleming School of Microbiology, London. Throughout his career he has made a special study of immunology and the epidemiological and laboratory aspects of communicable diseases and their control. As a member of various scientific committees of the Medical Research Council of Great Britain and the Ministry of Health for England and Wales, he has helped to organize and direct controlled trials of prophylactic vaccines and of chemotherapeutic substances in tuberculosis, whooping cough, influenza, typhoid fever and other infections. He has undertaken a number of assignments for WHO, and last year he was Chairman of the WHO Scientific Group on Vaccine Research, convened under the intensified WHO programme of medical research.

Medical supplies in West Bengal

Mr J. E. Williams, of the United Kingdom, has been assigned by WHO to advise the Government of West Bengal, India, for a period of three months on the purchase, storage, distribution and estimation of requirements of medical supplies.

Mr Williams is Supplies Officer to the United Bristol Hospitals, England, and a member of the Pharmaceutical Society of Great Britain. In 1952, he undertook a two-year assignment for WHO as medical stores management officer in Ceylon, returning there for a short " follow-up " visit in 1958. In 1957, he served in Afghanistan as WHO short-term consultant to the government on the storage and management of medical supplies.

Health education appointment

Mr Gerald Specter, of the United States, has recently been appointed WHO Health Education Adviser in Patna, India. The assignment is for two years and, among other responsibilities, he will advise and assist the government in developing a health education bureau in the State Directorate of Health Services. Mr Specter has had considerable public health experience and has been working with the Philadelphia Tuberculosis and Health Association as Director of the Health Education Department.

Community development in India

Dr Josef E. Wingren, of Finland, has been appointed WHO public health adviser to the health programme in the State of Bihar, India. The aim of this programme and of similar programmes in other Indian states is to integrate rural health services into the over-all national community development programme.

Dr Wingren obtained his medical degree from the University of Helsinki, and holds a Diploma of Tropical Medicine from the Institut Tropical, Antwerp. For the past five years, Dr Wingren has been Chief Public Health Officer of the Municipality of Jakobstad, Finland.

Leprosy in Ethiopia

Dr Michel Lechat recently visited Ethiopia as WHO short-term consultant to the leprosy control and training programme now being carried out in that country with help from WHO and UNICEF. This programme provides outpatient treatment through small stations covering limited areas of high incidence, under qualified supervision from central leprosaria, and the training of local personnel for the extension of this work. The total number of leprosy cases in Ethiopia is estimated at 200 000.

Dr Lechat is at present Director of the Leprosarium of Yonda, Coquilhatville, Belgian Congo, where he has greatly contributed to the physical rehabilitation of leprosy patients.